DECEMBER, 1954

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

1934 · 1954 20th ANNIVERSARY YEAR

ELICAL CARBIDE MILLING
Speeds Metal Removal

•

WORK-HOLDING
METHODS

•

Application Engineering
of PORTABLE AIR TOOLS

•

OL ROOM MEASUREMENTS

•

AIR TOGGLE CLAMPS

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Fast-Acting Universal
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NEWS
of People, Products,
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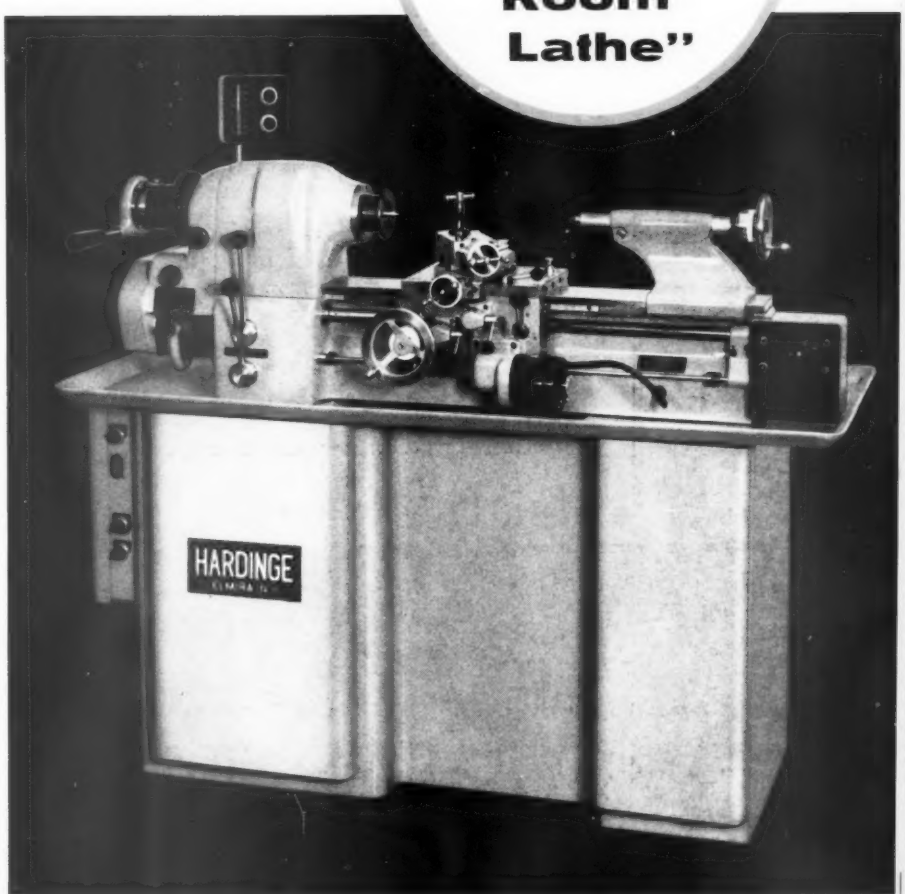
ELMIRA, N.Y.

"The Outstanding Tool Room Lathe"



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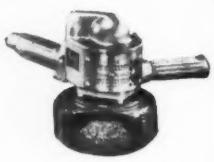
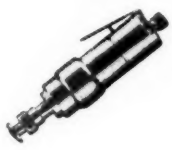


VERTICALS



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IMPACT WRENCHES

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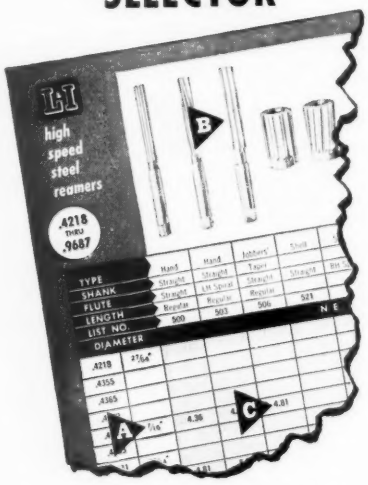

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CIRCLE INFORM-A-GRAM KEY NO 4

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

formerly
Tool-Die-Machine PROGRESS 1934-1941
TOOL & DIE JOURNAL 1941-51

VOL. XX—No. 9 DECEMBER, 1954

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They have the influence that enables them to adopt the ideas and the processes which TOOLING and PRODUCTION describes in every issue AND the authority to recommend, to specify and/or to buy everything that may be needed to reduce costs, increase production or improve quality. These men for whom, each month, our editors seek out or write TOOLING and PRODUCTION'S meticulously accurate stories of "Know-How" and "Tell-How" are T & P's exclusive Cycle of Buying Influence (CBI) in their plants.

Every copy is directed to these men by name, by title and by company address. Please see our BPA verification.

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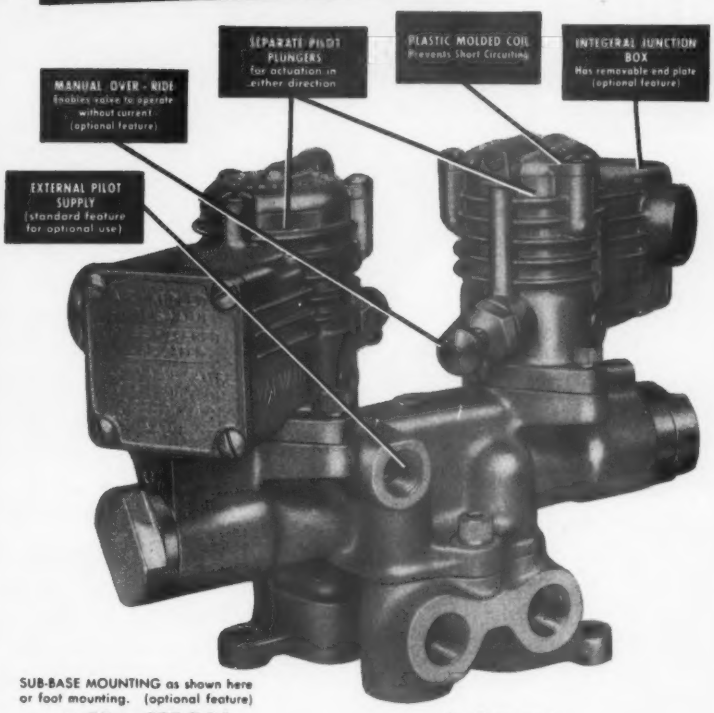
PERFORMS THROUGH MILLIONS OF CYCLES WITHOUT DANGER OF BREAKDOWN OR COIL BURN-OUT


SEPARATE PILOT PLUNGERS for actuation in either direction
PLASTIC MOLDED COIL Prevents Short Circuiting
INTEGERAL JUNCTION BOX Has removable end plate (optional feature)
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MANUAL OVER-RIDE (Optional feature) This makes possible operation when electric current is off. Job set-ups can be made by one man without turning on the current.

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- ☐ The New Double Solenoid Speed King Valve
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CIRCLE INFORM-A-GRAM KEY NO. 5

They handle the job faster with

CINCINNATI Shears

at LITTLEFORDS . . .

Shearing stainless steel for tanks in the Littleford Shops.

Photos courtesy Littleford Bros., Inc., Cincinnati, Ohio.

"Faster handling—with a high degree of accuracy", say Littleford Bros.

Simple, rapid and positive gauging, with the accurate shearing performance of these Cincinnati Shears—gives a clean cut economical production, with long knife life and low maintenance."

Write for Shear Catalog S-6.

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- Master Pushers and Pads
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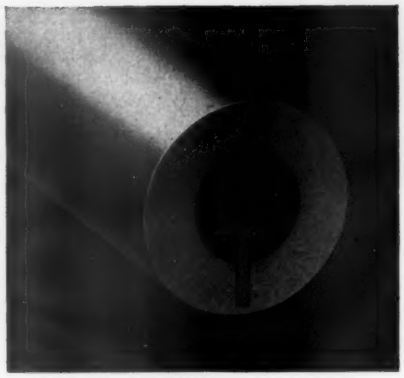
CIRCLE INFORM-A-GRAM KEY NO. 7

a hole here is annoying . . .



a hole here is helpful

Crucible Hollow Tool Steel Bars are helping eliminate the wasteful practice of drilling out a solid bar to make ring-shaped, or tubular steel parts, or tools with a center hole. The hole is already in Crucible hollow tool steel bars . . . no need for drilling, boring, cutting-off or rough-facing operations.

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Call your Crucible representative for the full story of how these steels can best save you time and money. You'll be glad you did.

54 years of Fine steelmaking

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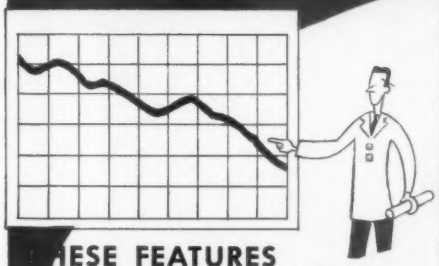
HOLLOW TOOL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 8

Blade Spade Drills — 5" diameter in stock sizes. lasts indefinitely, only blades need be replaced.



Cut Tooling Costs

with WAUKESHA Standard Cutting Tools...

Adjustable Blade Reamers — Inserted Blade Spade Drills — and other Standard Cutting Tools by Waukesha — are saving thousands of dollars in tooling costs, in all types of reaming, drilling and boring operations. Their versatility and adaptability eliminate substantial investments in special tools — and their inherent features result in operating and maintenance economies which you cannot afford to overlook.

consult WAUKESHA

— for Competent Cutting Tool Counsel. Waukesha sales representatives and engineers are qualified to work with your staff in adapting Standard Waukesha Tools to your needs — or, if necessary, in developing Special Cutting Tools for your unusual needs.

Representatives in Principal Cities

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f Standard WAUKESHA
Inserted-Blade Cutting Tools
Save You Money —

Replaceable Blades — Cost only a fraction of the price of a solid tool, assure long term economy.

Interchangeability — Each size of Waukesha Spade Drill Holder takes a ½" range of sizes in spade blades, except in the smaller sizes which cover only a ¼" size range.

Shear-Cutting Action — Waukesha Blades have a "knife-slice" cutting action that curls chips away from stock, prevents scoring, assures free cutting, requires less power.

More Grinds per Blade — More Holes per Grind
Waukesha Blades can be advanced and re-ground before discarding — yielding a substantial saving over High Speed Solid Steel Tools — and the high quality of Waukesha Blade Stock assures More Holes per Grind.

CIRCLE INFORM-A-GRAM KEY NO. 9

*** DE VLIEG OF DETROIT**

... is proud to reproduce this unsolicited advertisement by American Type Founders as it appeared in nationally circulated technical magazines.

This ad is reproduced through the courtesy of AMERICAN TYPE FOUNDERS

This machine hunts for—and finds—dead center!

This De Vlieg Jigmil is used to locate and bore the cylinder, gear-driven ink rollers, and gear bearing holes in ATF Chief frames.

Once the adjustments have been set, the Jigmil automatically positions every subsequent frame by moving its machine table or spindle head until the desired center is located to within 3-5/10,000ths of an inch. Then this 12-ton precision borer is micrometer-set so accurately that it will remove a pencil mark from a boring without cutting the metal.

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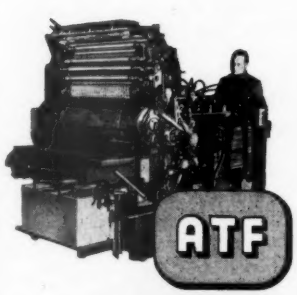
It will pay you well, next time you're in the market for a small offset press, to ask for the full story on the precision-engineered ATF Chief. Write AMERICAN TYPE FOUNDERS, *a subsidiary of Daystrom, Inc.*, 200 Elmora Avenue, Elizabeth, New Jersey.



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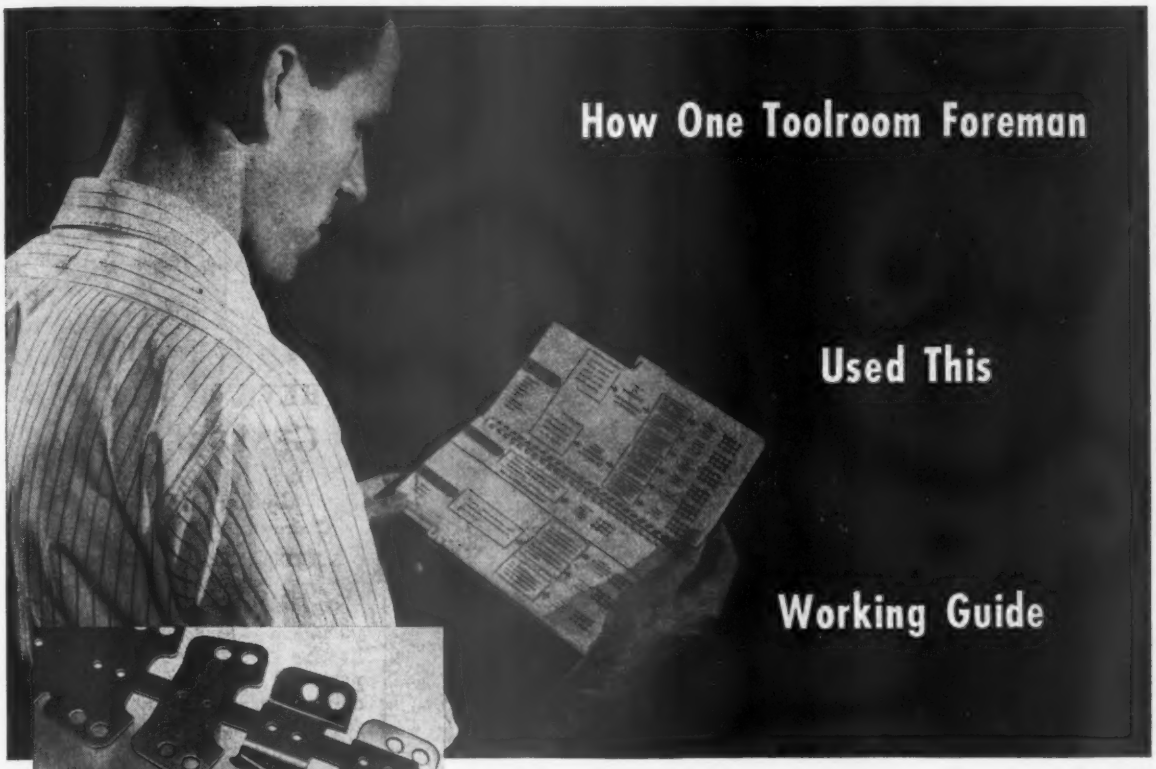

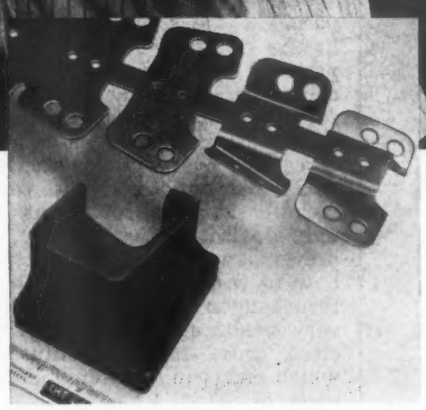

Job: Punch that blanks stampings from SAE 1010 strip, .062" thick.

Problem: The punch is so unbalanced in design that safety in hardening is vital. Also, the punch is shear fitted to the die, and hardening accuracy is necessary to avoid expensive adjustments after heat treating. Other die steels were tried, but they either broke or changed size too much.

Solution: At this point the Toolroom Foreman called in Carpenter and started to become more familiar with the Matched Tool and Die Steel Manual. The Manual pointed to Carpenter *Vega* (Air-Tough) Die Steel for the punch. Now they're coming through right on the nose. Moreover, production between grinds has jumped from about 10,000 to 50,000 stampings. And the Foreman says that from here on, all his tools and dies will be made from Carpenter Matched Tool and Die Steels. (Write for a more detailed Field Report on this job.)

. . . To Increase Tooling Productivity

This is for the man responsible for tools and dies who looks at a diemaking job with these thoughts:

"How can I make it *easier?*"

"How can I avoid costly *heat treating hazards?*"

"What can I do to *improve the job?*"

If you're that man, Carpenter wants to help. We offer you plain, *practical* help based on almost 70 years' experience working with other men who feel like you do.

How does it pay off? Look at a typical example shown to the left! And your Carpenter representative can show you many more Field Reports of other interesting jobs.

Much of this help is packed into a 189-page working guide . . . Carpenter's "Matched Tool and Die Steel Manual". And that's only part of the program . . . a program backed by *dependable* die steels developed in Carpenter Research Laboratories with a long record of pioneering in new and improved steels.

We're ready to work with you, now. A call to your nearest Carpenter Mill-Branch Warehouse, Office or Distributor will tell us you are, too. THE CARPENTER STEEL CO., 106 W. Bern St., Reading, Pa.

Carpenter STEEL

Matched Tool and Die Steels

IMMEDIATE DELIVERY from local warehouse stocks

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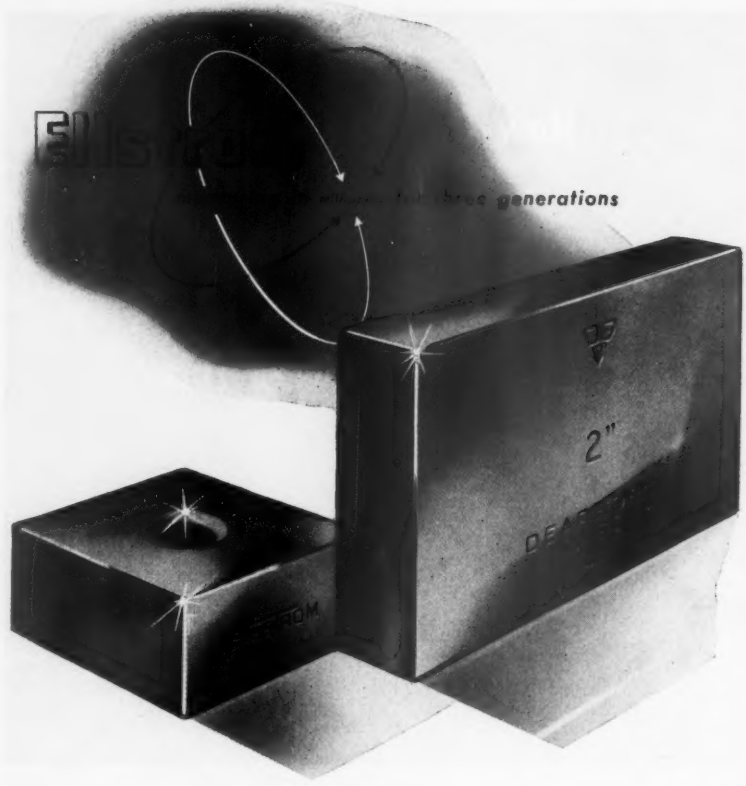

No finer GAGE BLOCKS at any price!

By any comparison you care to make . . . block-for-block, set for set . . . you'll find Ellstrom Chromium Plated Standards truly outstanding in the field of precision measurement. Materials used in their manufacture are precisely treated and thoroughly tested for coefficient of expansion, uniform hardness, and metallurgical stability. The durable chromium plated gaging surfaces are applied and finished by special Ellstrom methods which assure you of greater serviceability, longer wearing millionths. And flatness, parallelism, and specified accuracy of each individual block is fully certified by the most uncompromising final inspection found anywhere in the industry.

So next time you need gage blocks, specify Ellstrom Standards. Furnished in 28 basic sets, either square or rectangular styles, with block sizes in step series from .010" up to and including 20.000". Basic accessories also available . . . plus tungsten carbide wear blocks and individual blocks to meet your specific requirements.

IF YOU BUY GAGE BLOCKS, you should have this handy new Ellstrom Standards Catalog. Contains complete specifications and prices in convenient tabular form . . . and a copy is yours for the asking. Send for it today!

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Originators of Chromium Plated Gage Blocks

REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES AND CANADA

CIRCLE INFORM-A-GRAM KEY NO. 12

★ ★ ★ ★ ★ ★ ★ ★ ★

Talk of the Month

★ ★ ★ ★ ★ ★ ★ ★ ★

"How We Can Prevent Another General War"

by Harold S. Vance
Chairman, Executive Committee
STUDEBAKER-PACKARD CORP.

One of the phenomena of this period is the enormous growth in the ranks of self-styled experts in our country. Every columnist, almost every writer for newspapers or periodicals, even some men of the cloth, and of course, every last politician, either in or out of office, has very definite ideas about what is wrong with the world; how to prevent another global war and how to win such a war if it is thrust upon us. Perhaps this very wealth of opinion is a principal cause of the confusion which exists in the minds of so many of us today.

The purpose of this opening statement is to back up my assurance to you that I am no military expert; yet, paradoxically, I propose to give you, tonight, a simple formula by which I believe we can remove the fear, or at least any real basis of fear, that another general war will plague us in the foreseeable future.

Those of you who, like myself, have been engaged in the manufacturing segment of industry are acutely aware of the evolution, which might well be called

. . . Continued on page 16

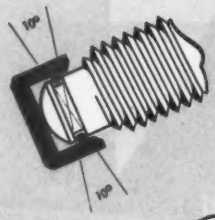
Editor's Note: A group of editors spent October 7, 1954 at the plant of the Cincinnati Milling Machine Company inspecting their production and research facilities and previewing several startling new machine tools. At the end of the day, we were guests of "The Mill" at the annual meeting of the American Ordnance Association, Cincinnati Post, where Mr. Vance gave this talk on war prevention. Prior to his remarks Mr. Vance was awarded the Charles L. Harrison Award for Distinguished Ordnance Service. The citation was read by Frederick V. Geier, President, Cincinnati Milling Machine Company and a director of the Cincinnati Post, A.O.A. We are pleased to relay Mr. Vance's thoughts to you. — E. W. P.

Northwestern's New

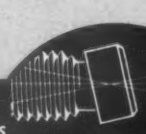
TOGGLE-SHOE CLAMPS

PATENT APPLIED FOR

SIZES—1/4-20 to 5/8-11
LENGTHS—1" up to 5 1/4"

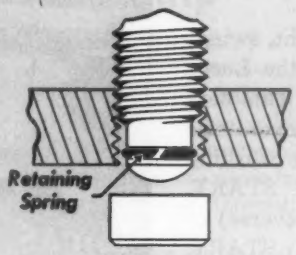


10° ADJUSTMENT *in all directions*

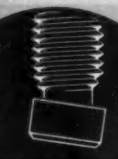


Retaining spring holds shoe in place yet allows a full 10° adjustment in all directions.

Dealers in most principal cities carry a complete stock of all Northwestern Tools

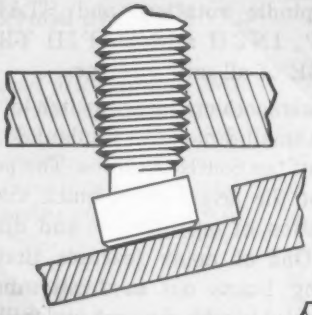


NO INTERFERENCE
Shoe only 1/16 larger than bolt

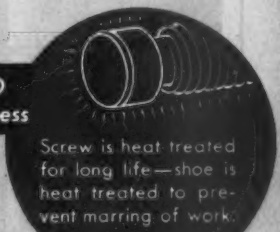


Short shoe design requires a minimum distance between fixture and the work.

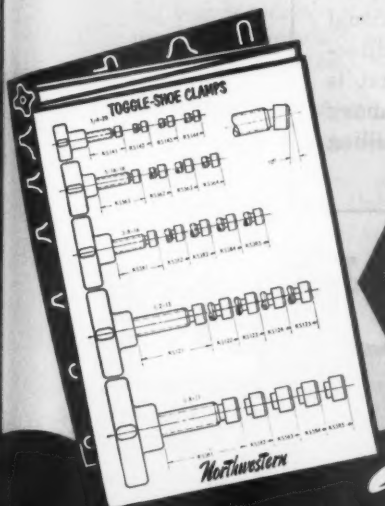
Write for *FREE TRACING TEMPLATE* of TOGGLE ASSEMBLIES IN ALL SIZES FULL SCALE



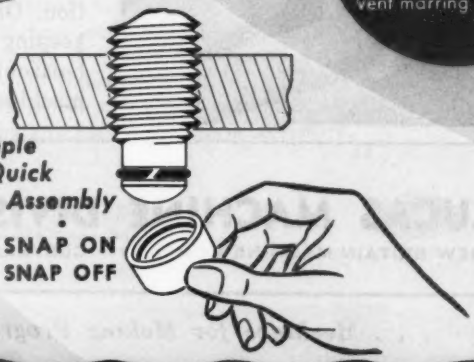
HEAT TREATED *for max. toughness*



Screw is heat treated for long life—shoe is heat treated to prevent marring of work.

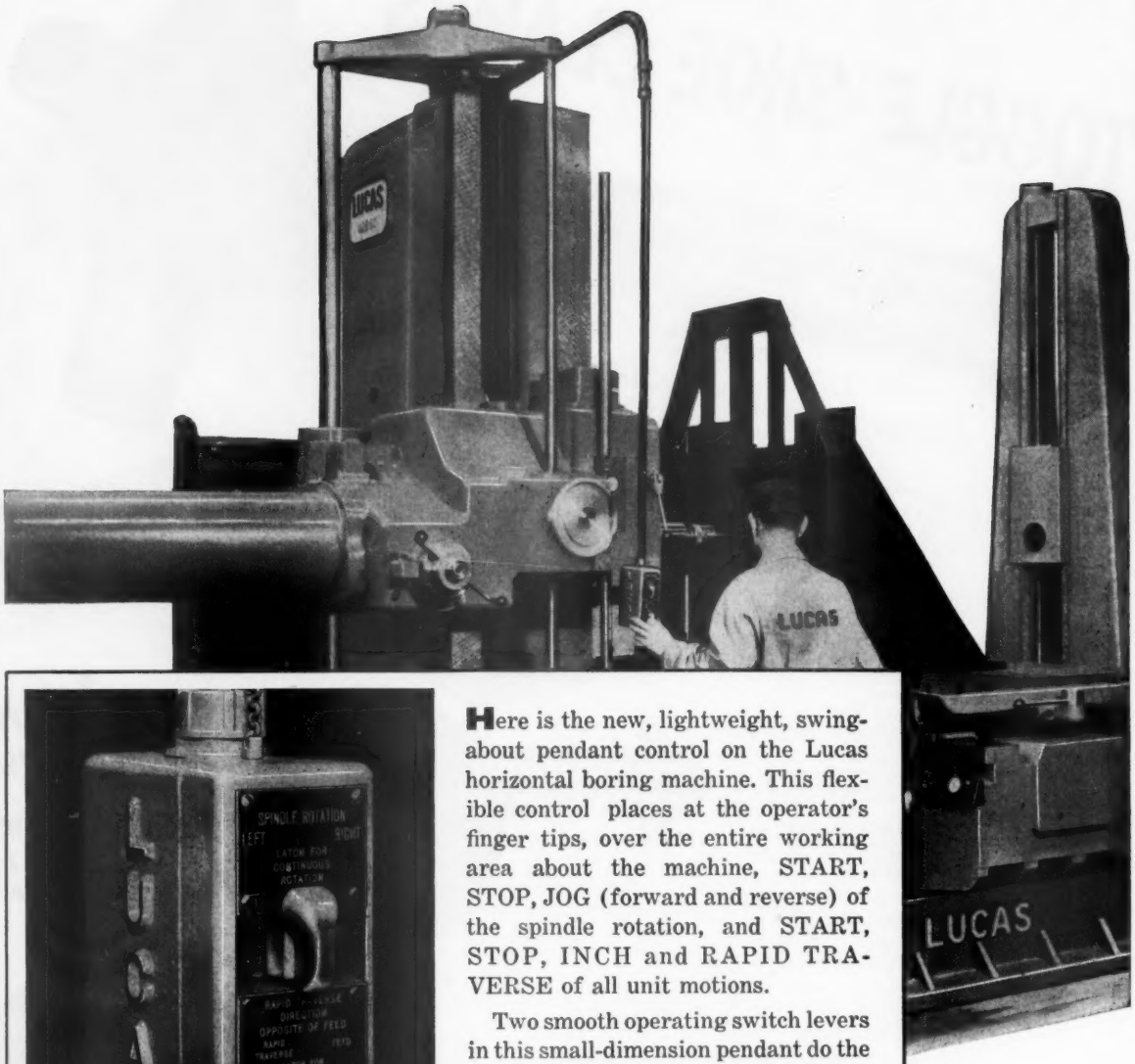


Free TRACING TEMPLATE 286 ITEMS *full Scale*



Simple Quick Assembly
•
SNAP ON
SNAP OFF

116 HOLLIER AVE. **Northwestern** DAYTON 3, OHIO



Here is the new, lightweight, swing-about pendant control on the Lucas horizontal boring machine. This flexible control places at the operator's finger tips, over the entire working area about the machine, START, STOP, JOG (forward and reverse) of the spindle rotation, and START, STOP, INCH and RAPID TRAVERSE of all unit motions.

Two smooth operating switch levers in this small-dimension pendant do the work of ten control buttons. The position of the levers gives quick visual indication of engagement and direction. One of many features that is keeping Lucas out in front among horizontal boring, drilling and milling machines.

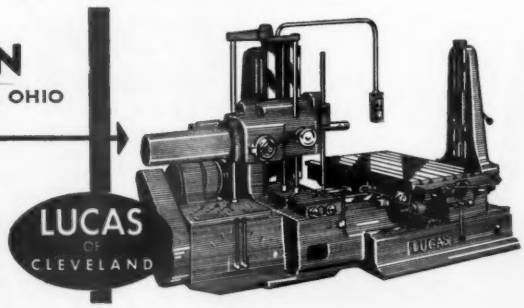
LUCAS MACHINE DIVISION

THE NEW BRITAIN MACHINE COMPANY • CLEVELAND 8, OHIO

. . . Machines for Making Progress

Lucas Horizontal Boring, Drilling and Milling Machines

Our general catalog is filed in the Sweet's Machine Tool Catalog File.



CIRCLE INFORM-A-GRAM KEY NO. 14

A SURVEY of importance to industrial managements

Leadership

in any sphere of industry is usually well defined—by product, service, reputation. For a recent widespread survey, an outside unbiased research organization selected *files* . . . contacted the purchasing heads of 37 types of potential file-using industries . . . and came up with these interesting facts.

"What make or brand of files do you prefer?"

"NICHOLSON" was voted first choice in 79% of the replies. Nearest to this were competitive brands "A," "B," "C" and "D" with 26%, 15%, 7% and 5% respectively. Eleven remaining brands received scattered preferences totaling 10%. (Some 200 replies contained two or more "first" choices.)

"What is of first importance in your file-brand preference?"

"Product reputation," said 295 respondents. "Service," said 282. Only 28 said "Price."

"From what sources do you buy your files?"

"From Industrial Distributors," said 619 out of 695—about 89%. And where Nicholson or Black Diamond brand is concerned the rate would be 100%—for that is the only channel through which Nicholson sells to the widespread industrial market.

• • •

The fact that these findings bear close similarities to other independent surveys made in the past leaves no doubt where Nicholson brands stand.

And what are the fundamentals to this emphatic Nicholson leadership? Product QUALITY, PERFORMANCE, UNIFORMITY and VALUE of the highest order. Product VARIETY that truly covers *A file for every purpose.* And, through your Industrial Distributor, the most helpful technical and supply SERVICE ever organized by any file manufacturer *anywhere.*

NICHOLSON U.S.A.

NICHOLSON FILE COMPANY, PROVIDENCE 1, R. I.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

BLACK DIAMOND MADE IN U.S.A.

NICHOLSON FILES *FOR EVERY PURPOSE*

CIRCLE INFORM-A-GRAM KEY NO. 15

It costs you money to WAIT!

that's the penalty for continuing WASTEFUL and OBSOLETE hand methods that hold down profits and production

Modernize your assembly department with DPS POWER SCREWDRIVERS and SELECTIVE PARTS FEEDERS

SPEEDIER ASSEMBLY OUTPUT at FAR LOWER COST in 1955 and the years to come

● Proven beyond question, one of the greatest contributions to modern industry, Detroit Power Assembling Equipment demands your immediate consideration. Start now—Share its advantages with the thousands of the nation's prominent users.

DPS BOWL-FEEDERS *fill a Special Need!*

● In addition to our popular DPS Barrel Feeder, we offer the DPS Bowl Feeder designed to feed light, fragile parts that might not withstand tumbling. Operates on the VIBRATORY PRINCIPLE... fully automatic. Provides oriented single line feeding to Grinding, Packaging, Inspection and other automatic machines and operations.

Write today, send sample assembly—Give details!

DETROIT POWER SCREWDRIVER CO.

2827 W. FORT ST. DETROIT 16, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 16

. . . Month's Talk, from page 12

a revolution, which has occurred in production methods during the last generation. Machine power has been substituted for manpower; even machine thinking has been substituted for human thinking, to such an extent that a new word has been coined to describe the process—automation.

I should like to say to you that a similar evolution, again of revolutionary proportions, has taken place in the art of waging war; an evolution of the same kind as that of industry, in that weapons and instruments are replacing manpower as the all-important factor in military might.

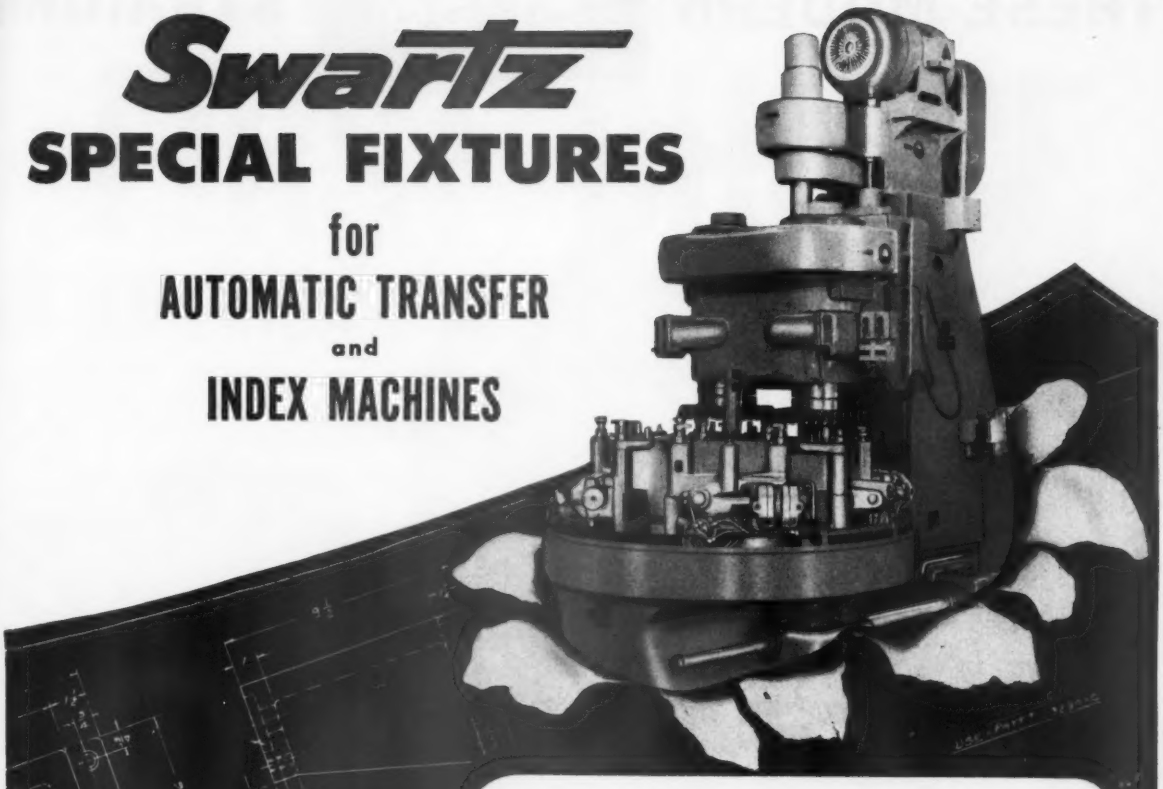
We persist in using employment as a yardstick for measuring the size and importance of an industrial enterprise, and so it is to be expected that we would continue to do the same thing in measuring military strength. As recently as last week, one of our top military experts predicted that the armed forces would require more manpower than heretofore as a result of the development of atomic weapons. But the fact of the matter is that, now and in the future, it is the **amount** and the **quality** of the equipment which we furnish our armed forces which will determine their striking power, and not, as in the past, the size of these forces in terms of human numbers.

When the British expeditionary force was compelled to evacuate the Continent in 1940, the personnel of a seasoned army was saved, but all of its equipment — tanks, guns, even small arms — was lost, with the result that the repatriated army was helpless against a threatened invasion across the Channel, which, happily, did not materialize. I cite this as an example of the importance of the **amount** or the adequacy of military equipment.

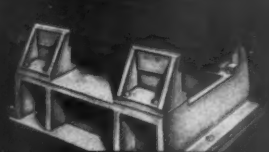
When the French Army faced the Germans from the outbreak of the war in September 1939 to June 1940, it, the French Army, had more guns, more tanks in numbers than did the Germans, but the French equipment was largely of World War I vintage, and this fact contributed largely to the fall of France. I cite this as an example of the importance of **quality** of equipment, as dis-

. . . *Continued on page 28*

Swartz
SPECIAL FIXTURES
for
AUTOMATIC TRANSFER
and
INDEX MACHINES



Swartz fixtures were specified for the 4-station Rotary Index Machine shown in the above illustration. The result—dependable, on-the-job fixture performance!



Here is a typical Swartz fixture installation, on a multi-station Transfer Machine. Another example of how Swartz efficiently serves the builders of modern automatic machine tools.

...from PART PRINT to FINISHED FIXTURE!

To both buyer and builder of automatic machine tools, Swartz offers a specialized fixture-building service . . . complete in every detail, from part print to finished product. Swartz fixtures represent the accumulated experience and skill of more than 30 years in this highly specialized field, and the advantages of Swartz service have become increasingly important with the rapid growth of automation.

If you use or build automatic machines, you can profit from Swartz service. Assure yourself of continuous production, with a minimum of costly down-time! *You can*, with dependable Swartz fixtures! They are guaranteed. Call in a Swartz engineer, to discuss your fixture requirements. You'll be glad you did.

Swartz service is presented in a new brochure, "Advancing Automa?ion", and a copy will be mailed on request.

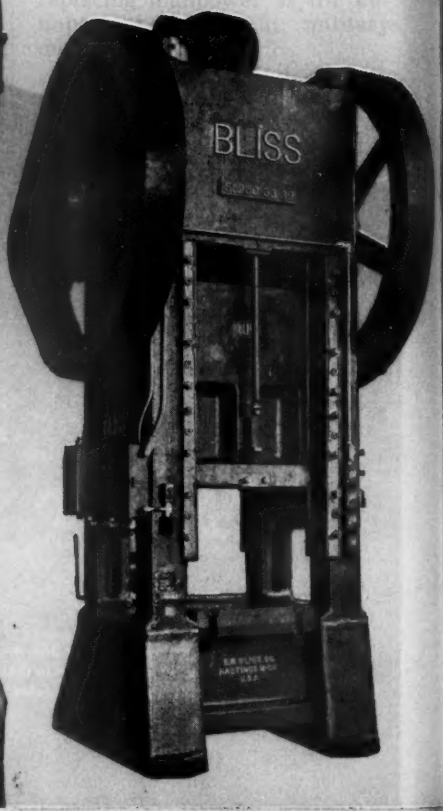
SWARTZ TOOL PRODUCTS
Division of Jefferson Corporation
13336 FOLEY AVENUE • DETROIT 27, MICHIGAN

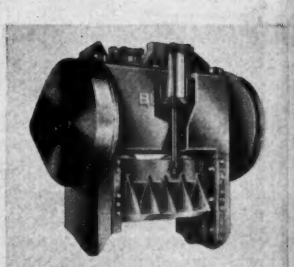
Designers and Builders of: Special Fixtures for Automatic Machine Tools, Pump Jigs, Standard Fixtures, Fixture Locks

More than 30 Years of Specialized Service to the Machine Tool Industry!

CIRCLE INFORM-A-GRAM KEY NO. 17

THESE MODERN BLISS STRAIGHT





Heavy box type crown, above, is reinforced with thick internal ribs front to back. Deep sections and large bearings provide rigid support for heavy SAE 1045 forged steel shaft, holds deflection to a minimum.

Air counterbalance, top right, maintains upward tension on main bearings—compensates for weight of dies, prevents backlash in gears, and eliminates takeup in main and connecting bearings when tension is reversed.

SIDE PRESSES ARE NOW

FIRST CHOICE

IN AMERICA'S METALWORKING PLANTS

About five years ago, we completely redesigned our single and double crank straight side press line—modernizing the line, complying with Joint Industry Conference standards, and adding many new features that resulted from careful study of user requirements.

While the presses were still in the blueprint stage, the news spread through industry. Relying only on the prints, enthusiastic customers volunteered enough orders to give one Bliss plant a four-month backlog before a single part was cast!

That enthusiastic acceptance is even greater today—with good reason. From the crown down these modern, rugged-duty presses offer as *standard* equipment unique design features like these—

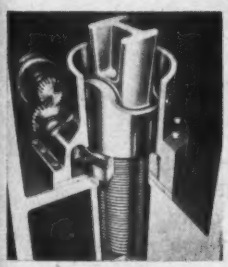
- The new presses are heavier, with deeper, thicker box sections... larger bed and slide areas.
- They feature the long barrel-type connection, making possible a range of slide adjustments *100% greater than prior standards.*
- Gibbing is longer—slide is entirely within the gibs during working portion of stroke, *even when adjustment is down.*
- New cool-running air clutch with longer wearing linings is standard on most sizes.

Thanks to these and other new features, Bliss straight side presses have been proved—in plant after plant—to hold their accuracy longer. They've been proved to render far longer die life... to minimize maintenance.

And yet their cost is *less* than you might think. To get the complete story on industry's most modern straight side presses, write today for copies of Bliss catalogs 17-D and 9-D. They're yours for the asking.

Want more information? Only the highlights of the Bliss straight side presses have been revealed here. For *complete* description of the exclusive design features of industry's most wanted straight side presses, detailed specifications, and a full listing of the standard single and double crank presses available, write today for our catalogs 17-D and 9-D.

Remember: BLISS for Presses, Rolling Mills and Special Machinery



Motorized slide adjustment, above, with locking brake has fully-skirted sleeve and long bearing surface to insure support through full limit of adjustment ... eliminates need for ring risers and stools.

Friction plates, top right, on both clutch and brake are easily removed without disassembling clutch or removing it from press. This feature alone saves hours of maintenance time.

BLISS

SINCE 1857

on your press is more than a name... it's a guarantee

E. W. BLISS COMPANY, Canton, Ohio

Subsidiary: The Die Supply Company, Cleveland, O.

E. W. Bliss (England) Ltd., Derby • E. W. Bliss Co. (Paris) France

U. S. Plants in Canton, Salem and Toledo, Ohio; Hastings, Michigan; and San Jose, Calif. *Branch Offices* in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo, Washington, D. C. and Toronto, Canada.

Other representatives throughout the world.

UNIVERSAL DRILL BUSHINGS

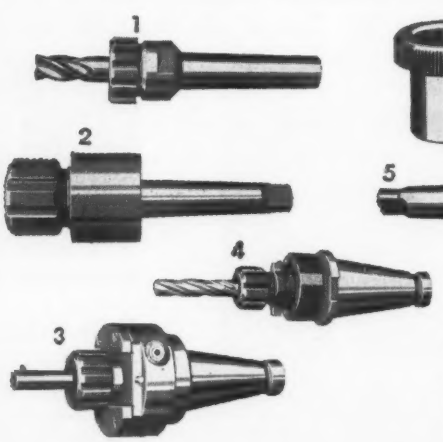
INSURE PERFECT ALIGNMENT AND LONG LIFE OF PRODUCTION TOOLS

KNURLED HEADS PROVIDE GOOD GRIP
SUPERFINISH BORES REDUCE TOOL WEAR
100% CONCENTRICITY AND HARDNESS TESTS INSURE ACCURACY
BLENDED RADIUS HELPS PREVENT TOOL HANG-UP

Universal Drill Bushings are available in a complete range of standard sizes and lengths. Special sizes made to order. Write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

181

UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 8
MICHIGAN



1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER

CIRCLE INFORM-A-GRAM KEY NO. 20

Miller

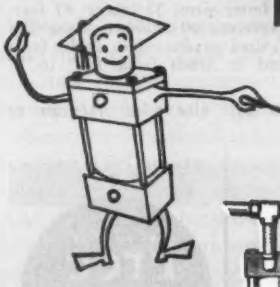
FLUID PRESSURE BOOSTERS

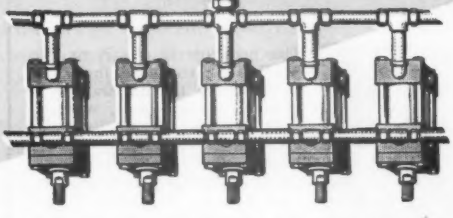
BOOST 80 PSI AIR

Input Range: 40 to 3000 psi Air or Fluid

TO 2000 PSI HYDRAULIC PRESSURE

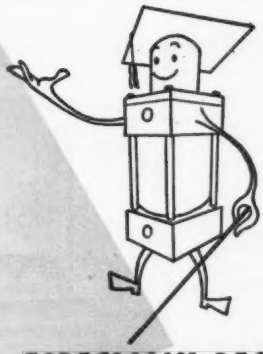
Output Range: 200 to 10,000 psi Fluid





- Save space, weight and investment cost by replacing pump installations in many applications
- Less costly to install, operate and maintain
- **Hold pressure indefinitely** without the motion and heat generation of ordinary pump circuits
- Provide—at point of cylinder thrust—more efficient power with less weight in less space than direct driven air cylinders
- Save up to 95% of air consumed by direct driven air cylinders
- Operate at speeds of 30 to 450 strokes per minute

NOTE: In addition to its most complete line of "Custom-Built" Boosters available on normal delivery, Miller offers 5" bore, 25 to 1 ratio, boosters for immediate delivery in either 6" or 12" stroke. Write for data and prices.



ESPECIALLY RECOMMENDED FOR

- **WELDING**
- **PUNCHING**
- **SHEARING**
- **CLAMPING**
- **RIVETING**
- **CRIMPING**
- **PRESSING**

and similar applications

FULL DETAILS IN MILLER BULLETIN B-200 SENT FREE ON REQUEST

Other Miller products include: Air cylinders, 1½" to 20" Bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

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Miller

MILLER FLUID POWER CO.

(Formerly MILLER MOTOR COMPANY)

2046 N. HAWTHORNE AVE. • MELROSE PARK, ILL.

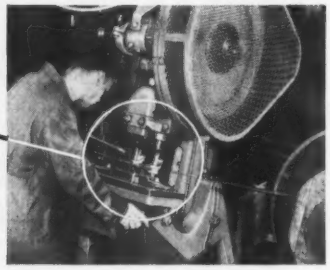
AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS COUNTERBALANCE CYLINDERS

money saving

Accessories for your plant

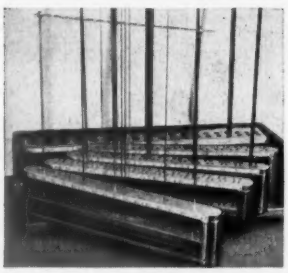
Each of the accessories illustrated and described below was designed and built for a definite need and used in our own plant before being offered to industry. They require a relatively small investment, yet will save you money every day. For further information, write for the folder offered below.

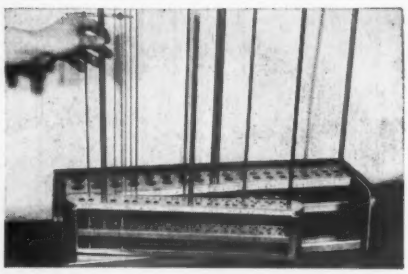
LEADER PIN OILERS



Eliminate wear on your die sets with these leader pin oilers. Acro Pin Oilers, as illustrated, fit over each leader pin and seals in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminate bushing wear, leader pin scoring, and maintain die accuracy. Die sets equipped with Acro Pin Oilers have run under tests for several weeks to a month without refilling.

DRILL ROD RACKS



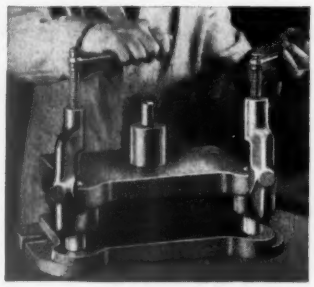


Eliminate trouble and waste effort with this modern method of storing drill rod. Put the Acro rack in a central location of each department and make it simple for each mechanic to select correct rod size in a hurry. It also provides a visual inventory for checking rod replacements.

Accommodates 26 letter sizes, 52 pieces; 47 fractional sizes, 138 pieces; 60 number sizes, 304 pieces. Fractional sizes graduated in 64ths from 1/32" to 1/2" and in 32nds from 1/2" to 1" included.

Also available in half size with fractions or numbers.

DIE SET PULLERS



The principle of the Acro Die Set Puller is to remove the punch holder from the die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving both leader pins simultaneously. This is accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented Acro feature, found only in Acro Die Set Pullers. Available in three sizes.

Free Data

covering each of these profitable accessories is included in our folder. Write for bulletin TP-54.

ACRO

METAL STAMPING CO.

330 EAST RESERVOIR AVE.

MILWAUKEE 12, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 22

MOORE SPECIAL TOOL COMPANY

Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc., 726 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

ACHIEVING PERMANENCE OF ACCURACY

Just as important as the initial accuracy of a precision machine tool is the *life expectancy* of this accuracy. And the most effective way to insure long-lasting accuracy is to give *dimensional stability* and *wear resistance* special consideration during machine design.

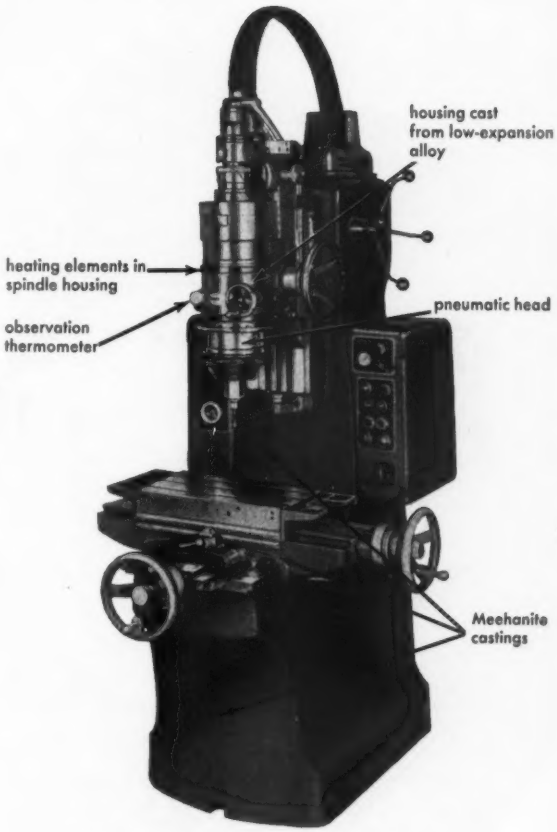
The following causes of dimensional *in*stability are most frequently encountered: thermal expansion, unstable constituents in the material; and stresses in the material. In the design of the No. 2 Moore Jig Grinder, all of these factors were taken into account and special features were incorporated to counteract them.

All the inherent accuracy of a measuring system, capable of positioning the workpiece in relation to the spindle within a tenth, is rendered nearly valueless if the spindle does not retain its position during machining operations. Such movement, caused by thermal expansion, is inevitable unless steps are taken during design to minimize or prevent it.

Electric heating elements were incorporated in the main spindle housing of the Moore Jig Grinder to maintain uniform temperature—whether machine is running or not. An observation thermometer is located so as to indicate any abnormal temperature change within the housing. The housing itself is cast from 36% nickel iron to further minimize effects of temperature variations. And a pneumatic head directs air onto the workpiece, preventing undue temperature rise both in the workpiece and in the locating members of the machine.

Instability resulting from gradual relaxation of locked-in stresses in castings is prevented by suitable stress-relieving cycles during the manufacture of Moore machine components. Similarly, the best way to avoid unstable hardened steel parts is by tempering them. Moore follows this practice.

Further wear resistance was built into the Moore Jig Grinder by means of: adequate way and bearing surface, scientifically proportioned to minimize and distribute wear; all reciprocating parts of nitrided steel—almost as wear-resistant as carbide; pressure lubrication of ways; lead screws and nuts made from nitrided steel and aluminum bronze, respectively, combining to offer low coefficient of friction, abrasion resistance and hardness; and dust protection devices.



Special design features of the No. 2 Moore Jig Grinder insure permanence of accuracy.

ACHIEVING GREATER ACCURACY QUICKLY is the job of Moore Jig Grinders and Moore Jig Borers. Both make possible accurate lead screw settings within .0001". This team will produce precision holes, contours and surfaces *in your shop* at minimum cost. For detailed catalogs, write to: Moore Special Tool Company, Inc., 726 Union Avenue, Bridgeport 7, Conn.

you can sharpen

4,800

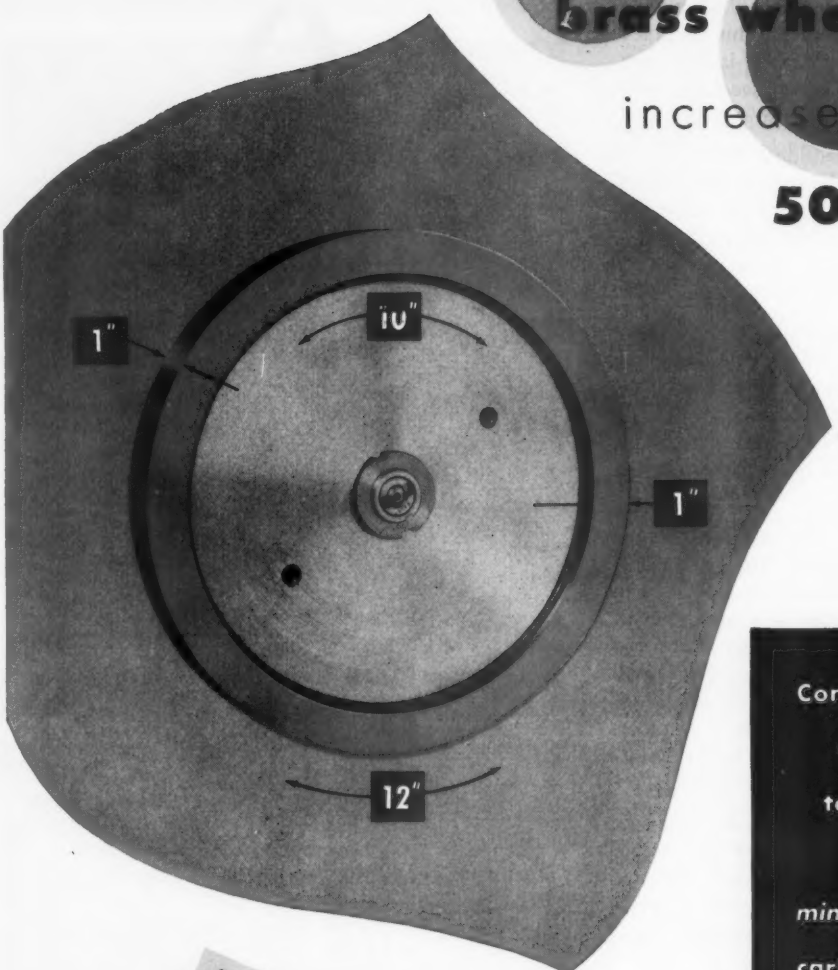
½ x ½ tungsten carbide

insert tools with this $45

brass wheel and

increase tool life

50 to 200%



Ave. cost per tool sharpened:

.009¢

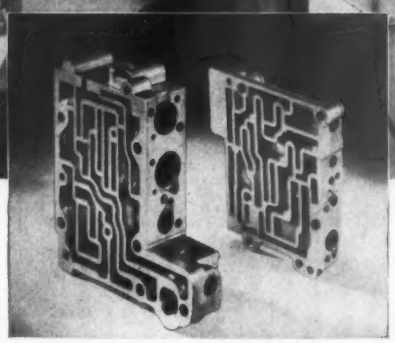
Convert from abrasive and diamond wheels to an Elox brass wheel and save 50 *minutes* sharpening 20 carbide insert tools.

WE CAN SHOW YOU HOW!

elox *corporation of michigan*

7334 north rochester road • clawson, michigan

CIRCLE INFORM-A-GRAM KEY NO. 24



Holes on extremely close centers vary in diameter from 1/16" to 13/16". The valve body has 33; the cover, 18.

"—BUT OUR PRODUCTION RUN IS LIMITED."

"SO WAS THE RUN ON THIS AUTOMATIC TRANSMISSION PART, BUT". . . .

HERE'S HOW ZAGAR TOOLING SAVED MONEY HAND OVER FIST

This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.

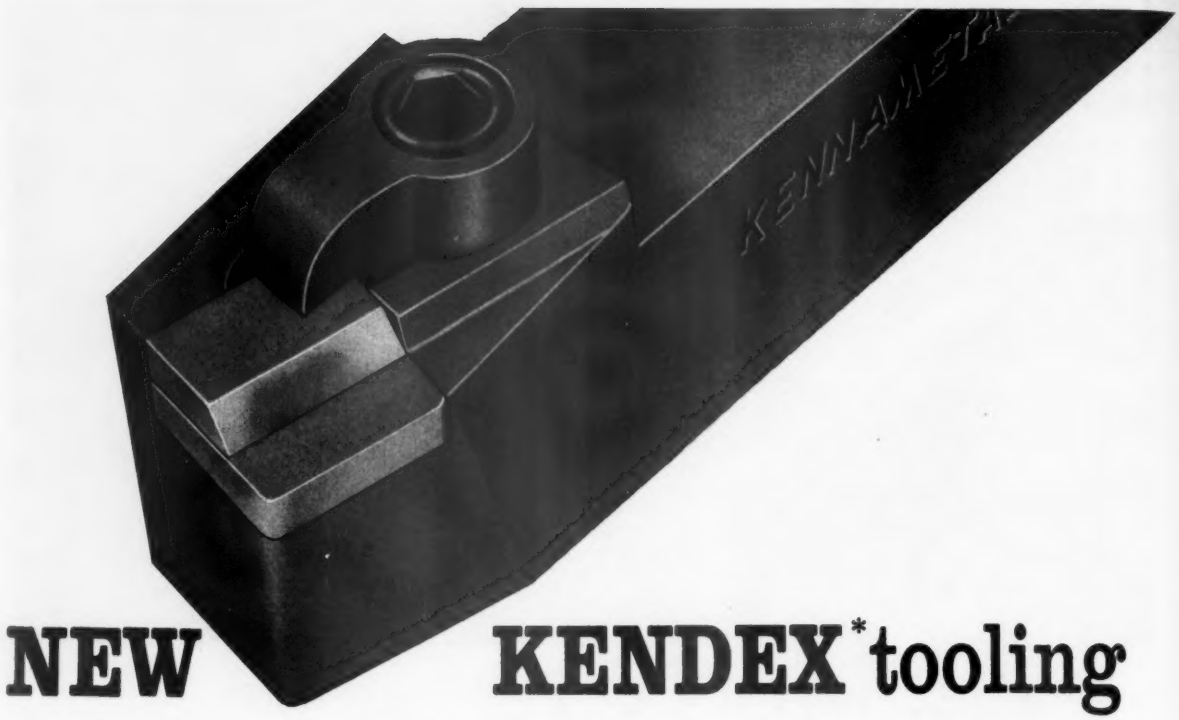
Ask on your letterhead for Bulletin "T-12."

ZAGAR TOOL, INC.

24000 LAKELAND BOULEVARD • CLEVELAND 23, OHIO

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

CIRCLE INFORM-A-GRAM KEY NO. 25



NEW KENDEX* tooling slashes cost per cutting edge

It's entirely new . . . everything except the long-established Kendex "throwaway button" principle pioneered and proved by Kennametal.

We took a good look at tool cost per cutting edge and designed a new Kendex with a clamp-on, "turnover" insert, plus a new system of chip control. This combination eliminates all regrinding, doubles the usable cutting edges per insert, and slashes tool cost on all types of machining operations. For example: On one job, tool cost was cut from $1.13 to $0.06 per piece.

NEW "TURNOVER" INSERTS

The new "turnover" inserts are designed with cutting edges on both sides, and can be indexed in seconds. After all cutting edges are used on one side, simply turn them over and use an equal number on the reverse side. Square inserts have eight cutting edges; triangular inserts, six.

These cost-reducing inserts are available in two types: (1) Regular, ground on top and bottom with corner radii ground for indexing; (2) Precision inserts, ground on all sides for precision indexing. When all edges are used . . . replace the insert and eliminate regrinding.

The new Kendex comes in a range of sizes in two models—Standard and Heavy-Duty. The Standard model is available with either Regular or Precision inserts; the Heavy-Duty with Regular inserts only.

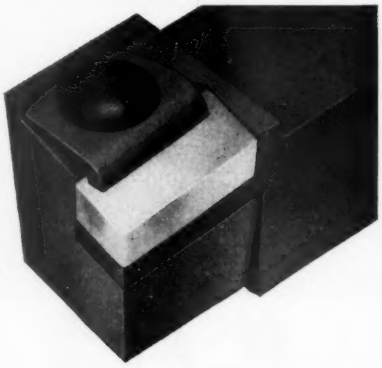
NEW CHIP CONTROL SYSTEM

The new Kendex design not only eliminates regrinding of inserts, but the grinding of chip breakers as well. Standard Kendex tools have replaceable carbide chip breakers which have the widest effective application of any mechanical chip breakers available. On many jobs, the chip breaker can be removed to prolong tool life. Heavy-Duty sizes (shown at right) are fitted with rigid, inexpensive spring clamps which serve as chip deflectors.

Replaceable, hardened steel shims (available on the larger shanks) prolong tool life, reduce tool maintenance, and eliminate grinding of holders in case of accident with the tool.

For complete information, call your Kennametal representative, or write KENNAMETAL, INC., Latrobe, Pennsylvania.

*Registered trademark



MINING, METAL AND WOODWORKING TOOLS

WEAR AND HEAT-RESISTANT PARTS

INDUSTRY AND
KENNAMETAL
. . . Partners in Progress

ABRASION, CORROSION-RESISTANT PARTS

PERCUSSION AND IMPACT PARTS

CIRCLE INFORM-A-GRAM KEY NO. 26

DOWEL PINS

HOW TO USE THEM

1. Precision Dowel Pins are principally used where parts must be accurately positioned and held in absolute relation to one another whether stationary or in motion. They facilitate quick disassembly and completely accurate re-assembly.

2. Allen Dowel Pins are also used as plug gauges.

3. As plugs for determining angular dimensions of dovetail slides.

4. As hinge and wrist pins in applications requiring initial and permanent accuracy.

5. As accurate, economical roller bearings and axles.

6. As guide pins, stops and position locators.

HOW TO JUDGE THEM

1. *On precision, for low tolerance applications.* (Allen Dowel Pins are ground to a maximum microinch finish of 6 RMS protected by a rust preventive.)

2. *On strength, for shear resistance.* (Allen Dowel Pins are made from special Allenoy Steel, heat treated. Single shear strength measures from 160,000 to 180,000 psi.)

3. *On hardness of surface and a core hard enough to prevent "mushrooming" when driven into a tight hole.* (Allen Dowel Pins have a surface hardness of 62-64 Rockwell C Scale and core hardness of 52-54. Average case depth .010 to .020 depending on size.)

The simple sure way to be sure of uniformly superior dowel pin quality is the same as in buying precision socket screws — *get genuine Allens from your Industrial Distributor.* Only he sells them but *we will welcome your direct request for literature or application engineering assistance.*

ALLEN HEAD

ALLEN

MANUFACTURING COMPANY

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CIRCLE INFORM-A-GRAM KEY NO. 27

USE
DETROIT
DIE SET
DIE SET NO. OR STYLE SSD-2
DIE SPACE "A" 45" "B" 30"
THICKNESS OF SHOE "C" 3"
THICKNESS OF PUNCH "D" 3"
DIA. OF SHANK NO shank
LENGTH OF PIN 12"
STYLE OF BUSH Steel Shoulder
PREC. OR COMM'L Precision
JOB NO. 5-1044
sure way to get
a quality die set
"USE DETROIT DIE SET," stamped on your blueprint, means you have specified a die set for accurate die work, fast mounting and long life . . . because of Detroit's high standard of factory-built and factory-tested precision.
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DIE SET
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TORONTO, CAN. . KE 2972
WASHINGTON, D.C. AD 4-5700
CIRCLE INFORM-A-GRAM KEY NO. 28

. . . Month's Talk, from page 16

tinguished from adequacy or amount thereof.

If my premise is correct — that amount and quality of military equipment are of paramount importance in modern warfare — it follows as a matter of course that they must be of the same importance in a defense program. Our defense program has a two-fold objective. Part of this objective is, of course, the successful waging of war if it must come. But the more important part of this objective is the prevention of war by showing our potential enemies, in a clear and unmistakable manner, what the outcome of a war would be.

The recently deceased dictator of a powerful nation, over whose policies we have been greatly concerned, is reported to have said that he had made a careful study of the history of all preceding dictators from Alexander the Great down to our modern Hitler and Mussolini, in order that he might discover and avoid their fateful mistakes, because he knew that all of them, without exception, had wound up in disaster. His conclusion was that dictators should avoid wars, at all cost, if they involved a substantial risk of losing everything which had been previously gained. This is a sound philosophy which I hope and believe will continue to guide the successors of the dictator in question.

Therefore, my thesis is that we can prevent war indefinitely if our defense program is of such a nature as to keep in war itself such a large element of risk — for the opponent, of course — that the probability of losing everything previously gained simply makes war a bad gamble.

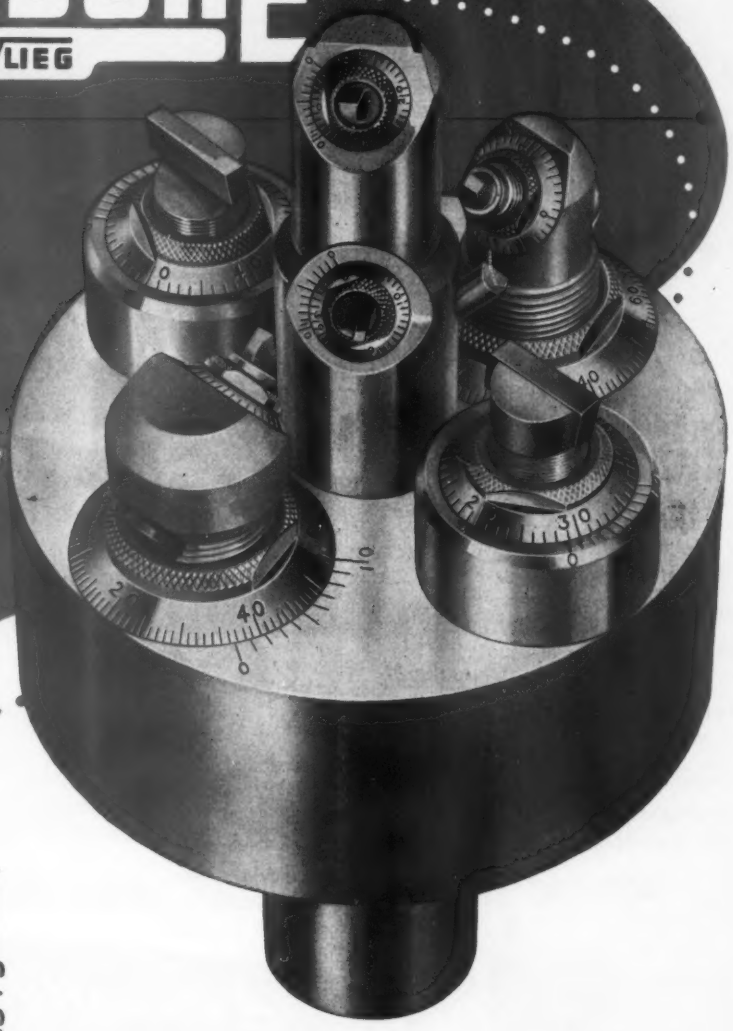
Let us put this idea to a test in a specific situation.

Some time ago, I was one of a small group which studied the problem of defense against aerial attack on Continental United States. Besides our own findings and those of military advisors, we had available to us the data and conclusions contained in similar studies previously made. I think I may say, properly, that it was my individual conclusion that there is no way of affording complete protection for every square mile of this country against damage from a surprise attack from the air, by any direct

. . . Continued on page 32

MICROBORE
by DEVLIEG

. . . THE
Multi-purpose single point adjustable tool
for
PRODUCTION BORING, TURNING and FACING OPERATIONS.



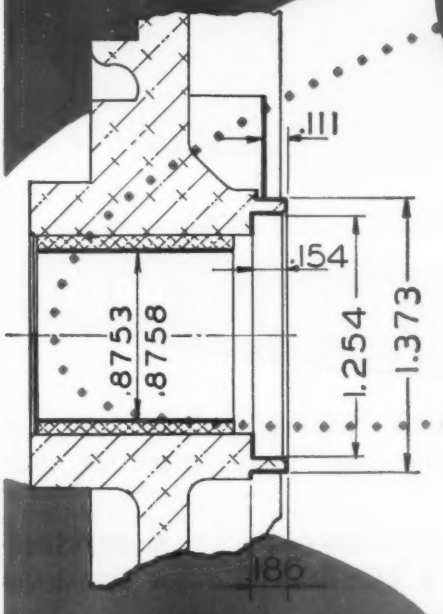


Illustration shows typical example of cluster tooling using standard Microbore units for machining eight surfaces in a magneto plate at one pass. Each tool is independently adjusted by proven micrometer vernier principle and precise limits of accuracy are maintained on production runs.

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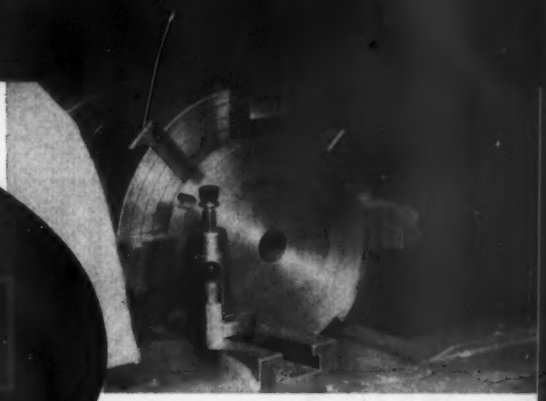
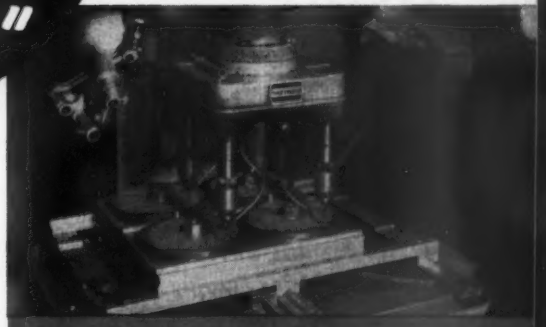
CIRCLE INFORM-A-GRAM KEY NO. 30

for these parts at
Pittsburgh-Erie Saw Corp . . .

"Latrobe's FM Steel a must"



Photographs Courtesy of Pittsburgh-Erie Saw Corp.



Tool life increased 40% when machining Latrobe's "Free-Machining" BR-4 FM at Pittsburgh plant.

Pittsburgh-Erie Saw Corp., Pittsburgh, Pa., reports . . . "Because of the greater ease of machining BR-4 FM, we are reducing our production costs and especially increasing our drill life. Savings in production time combined with greatly increased tool life makes Latrobe's FM steel a must."

Pittsburgh-Erie's experience is another example of the cost-saving benefits derived from using Latrobe's "Free-Machining" FM high alloy tool steels. These FM steels—high carbon-high chromium die steels with sulphide additives evenly distributed as a result of the "Desegatized" process—consistently result in improved machinability, better machined surfaces and production economy through savings in time, labor and tool life.

Results of Specially Conducted Test by Pittsburgh-Erie

Under the same production conditions, the performance of Latrobe's BR-4 FM die steel (with sulphide additives) was compared to that of a regular high carbon-high chromium die steel of similar analysis and hardness.

ROUGHING CUT

	OTHER STEEL	BR-4 FM
Speed	180 RPM	392 RPM
Feed	.014 in.	.024 in.
Depth of Cut	1/16 in.	1/16 in.

FINISHING CUT

Speed	180 RPM	392 RPM
Feed	.014 in.	.010 in.
Depth of Cut	.015 in.	.015 in.

DRILLING TIME

Hole Size 1/2" Plate Thickness 3/4" Hand Feed

BR-4 FM—23 seconds per plate per one hole.
Other Steel—45 seconds per plate per one hole.

Latrobe
STEEL COMPANY
LATROBE, PENNSYLVANIA

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. . . . . built with adjustable, interchangeable units used in combination, for gaging:

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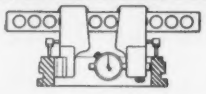
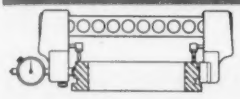
0" to 6"

LARGE INSIDE DIAMETERS



Gaging inside diameter

LENGTHS



Length gage

GROOVES, SLOTS, SHOULDERS
with quick-change, blade type contacts

AS BENCH COMPARATOR

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Bench Comparator

WITH BENCH STAND

0" to 3"
BASIC GAGE
with .0005 indicator as shown
$57.50

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CIRCLE INFORM-A-GRAM KEY NO. 32

. . . Month's Talk, from page 28

method of defense now available to us.

But the job can be done **indirectly.** Suppose that we build up and maintain and **constantly improve** a powerful retaliatory bombing force, and suppose we protect that retaliatory force so that it cannot be destroyed or seriously impaired. Under such circumstances, an attack on us would be fraught with such risk — in this case, the risk of massive retaliation — that I am sure the attack on us would never be made.

This idea of defense through fear of retaliation is not just psychological in its import. It constitutes a real, and to be calculated, risk that any military tactician would weigh against the remote possibility of a quick victory by demoralizing our country with one all-out attack.

The next step in my story is in the form of a question. How can you and I, as laymen, help to keep this heavy risk in any war which might be started against us?

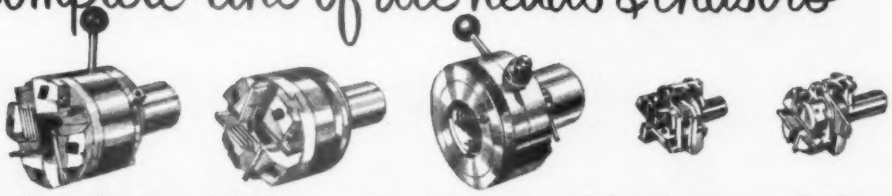
I believe that we can help in several ways. First, by cooperating with the authorities in Washington who are responsible for planning our defense program; by offering our ideas and our talents, and our help in developing and in putting into effect the important industrial part of our over-all defense program for which, for our purpose tonight, I should like to substitute the name "war prevention program." The specific objective about which I am now talking is that there be available, when needed, all the implements of war — guns, tanks, planes, ammunition, missiles, and a great variety of things — in quantities sufficient that all of them may be employed without stint in accomplishing what, unfortunately, we did not accomplish in our last military effort — a quick and decisive victory.

Second, we can help our military planners keep the risk in war if we will encourage our idea-men who make up our research and development organizations to address themselves to the need for constant improvement in types of military equipment with which they are familiar — how they can be made better, how they can be made

. . . *Continued on page 102*

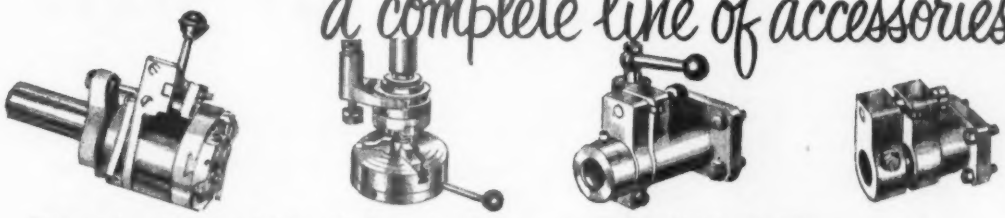
Jones & Lamson offers...

a complete line of die heads & chasers



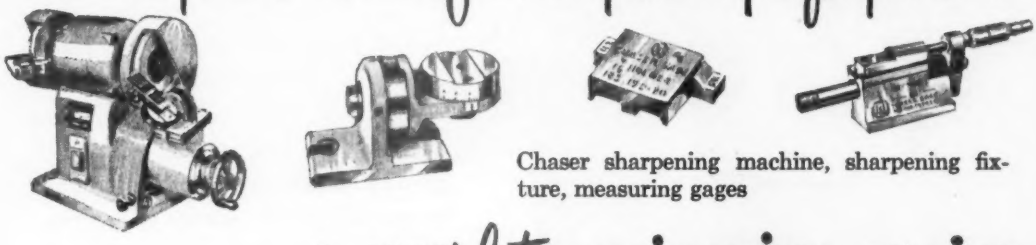
Automatic opening tangent stationary and revolving types, radial stationary type, B&S and small turret lathe types

a complete line of accessories



External and internal trip attachments, drill press adapter, floating holders

a complete line of sharpening equipment



Chaser sharpening machine, sharpening fixture, measuring gages

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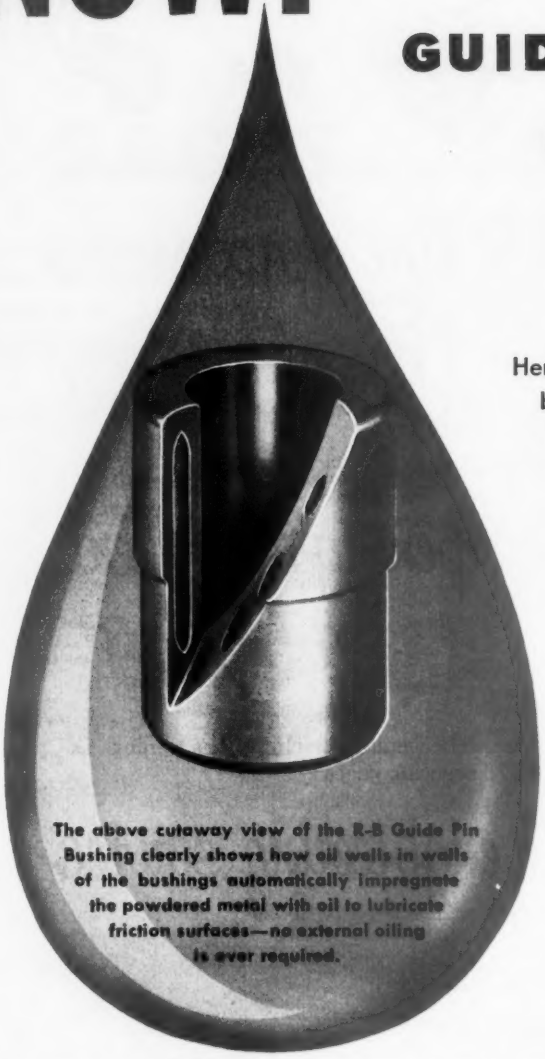
NOW! Self-Oiling GUIDE PIN BUSHINGS OF POWDERED ALLOY STEEL



The above cutaway view of the R-B Guide Pin Bushing clearly shows how oil wells in walls of the bushings automatically impregnate the powdered metal with oil to lubricate friction surfaces—no external oiling is ever required.

Here's an entirely new concept in guide pin bushings—made of heat treated powdered alloy steel, each bushing has filled internal oil wells. Lubrication to friction surfaces is automatic and no external oiling is required throughout the long life of the bushings.

Wear characteristics of these bushings are comparable to that obtained with finest bronze bushings. In addition, this new R-B design greatly reduces guide pin wear and the possibility of seizing or galling. Self-oiling, less guide pin wear and longer life add up to minimum maintenance, reduced costs and maximum usage of press time.

4117

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. . . with the No. 5 Plain Grinding Machine. You conserve time, motion, and effort with the No. 5, and consistently grind small parts to a tenth or less! The recessed design of the base and convenient grouping of all controls permit your operators to sit comfortably at the machine while maintaining highest production. Automatic cycles reduce operator's task to loading, starting, and unloading. When equipped with ELECTRALIGN, alignment control to 0.0001" becomes simple and positive. Get the complete story . . . write for detailed Bulletin on the No. 5—one of an outstanding line of 18 Grinding Machines offered by Brown & Sharpe.
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. . . **Brown & Sharpe Electronic Measuring Equipment.** Here is a "foolproof" way to let your machine operators measure from 0.0001" to 0.00001"—with human error practically eliminated. The Electronic Amplifier (shown here attached to machine and equipped for either precision aligning of work in the machine or for external measuring) magnifies measurements made on comparators 1800 to 18,000 times. Its true linear response simplifies setting —only one master needed. And the same Amplifier may be used with a number of measuring devices—for external or internal measuring or with special gaging fixtures. Fast response, high stability, and freedom from change by temperature or voltage, have all contributed to making the equipment extremely practical wherever precise measuring to close limits is essential. Write for detailed information on these precision measuring devices.

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KELLER PISTON-TYPE AIR MOTORS are engineered to afford maximum power in small units . . . with a high power-to-weight ratio. Reversible operation and infinitely variable speed (from zero to full rating) provide complete control. Keller Air Motors cannot "burn out" from overload, and they are nonsparking for safety.

WRITE FOR CATALOG SECTION NO. 70 for detailed information

Keller Air Motor used to drive the impeller for agitating enamel in a dip tank.

This air motor operates a 14" valve in an oil refinery where safety is a must.

Keller Air Motors power tilt-turn-table for enameling red-hot bathroom fixtures.

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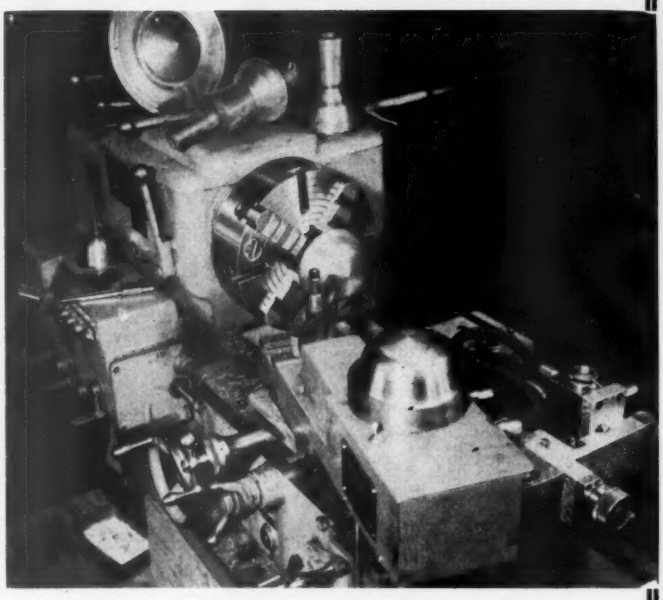
CIRCLE INFORM-A-GRAM KEY NO. 37

TRACER CONTROLLED MACHINING APPLIED to the LATHE as USED in the CERAMIC INDUSTRY

Mr. Duplicator

MR. DUPLICATOR SAYS: "Walker, on our breakfast table we have bowls, cups, saucers, and plates; we are wondering how your Duplicator could be brought into play in this type of endeavor?

WALKER SAYS: "Mr. Duplicator, we are way ahead of you. We have many of our hydraulic Duplicators mounted on lathes designed to duplicate from a revolving model and also our step-turning design. These parts being made with the Duplicator and used in the making of ceramic molds, are of the universal step-turning design. The form is first put into a template and the Duplicator reproduces this form in steel. Accuracy is beyond question. The time saved is unbelievable over the old hand method of cut and try.



Parts shown here are actual jobs. The WALKER DUPLICATOR made these. Can yours?

Witness on the lathe some of the many shapes that have been reproduced from a template. The versatility of our universal step-turning design Duplicator is brought out in this application to the very fine Rockford lathe. Note that our Duplicator can be swiveled to any desired angle. The need for this odd positioning of the duplicating compound was due to a protruding lip on this bowl—a happy medium had to be found between the two angles being reproduced. The tracer was loosened on its bracket and moved so that the right angle micrometer adjustments were arranged for, even in this odd position. Only could this job be done with our universal step-turning design.

Years ago our Mr. Walker built the first successful hydraulic Duplicator attachment for the Rockford planer, and as the years have gone by, we today build the best Duplicator for the very fine new Rockford lathes. Not only can we put a Duplicator on your Rockford lathes but any other lathes that you have in your shop regardless of size from the smallest to the largest. Let us know the make of lathe you would like to modernize with our hydraulic Duplicator and the type of job you wish to do. Our photographs that we will send you will probably be doing the identical job or one very close to it.

Our approximately 25 years of building nothing but Duplicators, which are cutting costs for hundreds of firms throughout United States, has made for us a host of friends. We would like to count you among them.

WALKER DUPLICATORS incorporate the latest design features. We know the answers because we wrote the book. Our ideas are copied by many as we continue to lead in the Duplicating field. We are the largest manufacturers of hydraulic Duplicator attachments for machine tools. Repeat orders are continually coming in. We can help you and will be glad to work with you on any of your problems. Write or call us today! Phone 7871.

REPRESENTATIVES IN PRINCIPAL INDUSTRIAL AREAS

Walker HYDRAULIC DUPLICATOR CO.

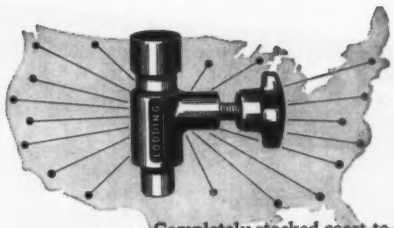
P. O. Box 467 STANDISH, MICHIGAN

Pioneer Designers and Builders of Precision Duplicating Equipment

CIRCLE INFORM-A-GRAM KEY NO. 38

In Jig and Fixture Components . . .

Get It Quickly



Completely stocked coast-to-coast distributors provide immediate shipment of parts like this spring jack — you get them much faster than you can make them yourself!

STANDARDIZE With

YOU GET WHAT YOU WANT

Here at Lodding you will find the most complete line of standard assemblies and details offered by anyone — all the components necessary to standardize your engineering practice, save design and labor costs.

AND YOU GET THE BEST

All Lodding fixtures are carefully engineered and quality-built to provide long, reliable service. Forgings and powdered metal are used in many cases. Every Lodding fixture is Parkerized to prevent rust.

Lodding INC.

81 BEACON ST., WORCESTER 1, MASS.

THE LINE
OF JIG AND FIXTURE COMPONENTS

CIRCLE INFORM-A-GRAM KEY NO. 39

HOW you can meet close tolerances on parts like these!

1

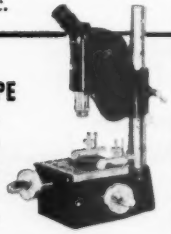
Bausch & Lomb BENCH COMPARATOR

Save every way! No costly holding fixtures needed for most work. No time-wasting set-up. Easy operation quickly provides vivid screen image, reveals costly production errors. Micrometer stage (optional) reads to .0001".

2

Bausch & Lomb CONTOUR MEASURING PROJECTOR

Quickly, easily shows sharp silhouettes or detailed surface views on 18" screen . . . for inspection, comparison, or highest precision measurements. Linear readings to .0001"; angular, to 1 minute of arc.

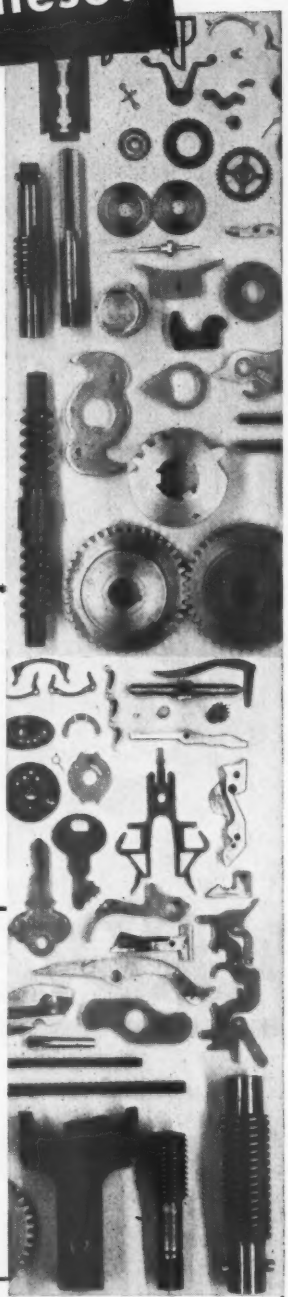


3

Bausch & Lomb TOOLMAKERS' MICROSCOPE

Quickly measures or inspects opaque or transparent objects of any contour. Linear readings to .0001"; angular, to 1 minute of arc.

SOLD AND DISTRIBUTED EXCLUSIVELY BY THE DoALL COMPANY For full information call your local DoALL Sales-Service Store, or write: The DoALL Company, 254 N. Laurel, Des Plaines, Illinois.



BAUSCH & LOMB

SINCE B&L 1853

Quality Control

INSTRUMENTS

CIRCLE INFORM-A-GRAM KEY NO. 40

"Commendable Comments"

"This country's next great economic advance must depend not so much on mass production as on new products developed by our research laboratories. Today as never before the future of America is being molded in our laboratories."

—Roy C. Ingersoll, President, Borg-Warner Corp., in an address to the Industrial Research Institute.

"Thus there is a rapidly developing field for detection devices based on entirely new principles which will increase the sensitivity, speed, and convenience of high-voltage radiography. It is from these developments that we can expect the greatest advances and the widest expansion in this non-destructive branch of the testing art in the years ahead."

—Dr. Ernest E. Charlton, consultant in nucleonics and radiation, General Electric Research Laboratory, from the Mehl Honor Lecture at the convention of the Society for Nondestructive Testing, Inc.

"A properly trained factory production worker need not fear he will be replaced by robots, yards of punched tape or an electronic 'brain'; job specialization and production-line automation are opening vast new fields of opportunity for both the graduate engineer and the technically trained production worker."

—Stanley J. Nelson, Factory Manager, Minneapolis-Honeywell Regulator Co., addressing vocational and industrial arts teachers.

"It is good news that our government and defense officials are becoming concerned as a result of the report that nearly three times as many college-trained engineers and scientists are now being graduated each year in Russia as in the United States."

—From special message by Dr. John T. Rettaliata, President, Illinois Institute of Technology.

"Automation, which is regarded as one of the most significant manufacturing developments of this generation, is a success only because of man's brains and skills. Technological progress benefits the public by giving better products, while providing workers with better, safer, and easier jobs."

—From remarks by C. H. Patterson, General Manager, Engine and Foundry Division at the opening of the V8 engine plant of Ford Motor Co., Dearborn, Mich.

"The average American's real purchasing power today is around 50% greater than it was only a half century ago."

—I. W. Wilson, President, Aluminum Company of America.

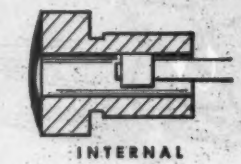
distinctive advantages...

You get them in TRIPLE C* GRINDING COOLANT by MOTCH & MERRYWEATHER

clear cool clean

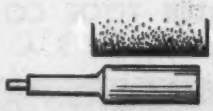
for results you can see . . .

TRIPLE C FOR ALL WET GRINDING

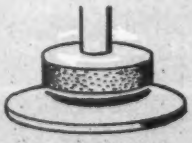


INTERNAL

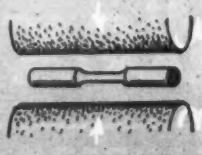
FLAT RECIPROCATING



EXTERNAL



FLAT ROTATING



CENTERLESS

Motch & Merryweather now offers Triple C Grinding Coolant to the metal-working industry. Triple C has been thoroughly tested and widely used with great success. Proven advantages:

CLEAR—transparent solutions—you can see the progress of your work. COOL—dissipates heat; maximum cooling maintained. CLEAN—flushes chips quickly; wheels stay clean and free-cutting. Filters remain clean and free-acting. There is no disposal problem. Grinding dust settles rapidly. Triple C does not foam or produce a foul odor, even on cast iron. Solutions remain stable. Desirable properties are maintained, even in the hardest water. Descriptive bulletin upon letterhead request.

Fifty Years 1904 · 1954

Triple C comes in 9-lb. and 50-lb. metal containers and in 150-lb. steel drums. Order a supply today from your local M. & M. dealer.

THE MOTCH & MERRYWEATHER MACHINERY CO.

CUTTING TOOL MANUFACTURING DIVISION

*TRADE MARK

CLEVELAND 17, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 41

NOW

a better product made BETTER

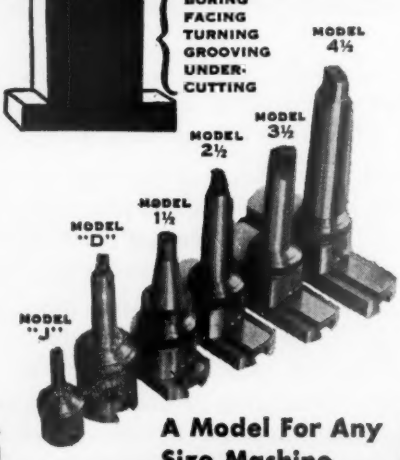
WITH THESE ADDED NEW FEATURES:

1 ADJUSTABLE TAKE-UP TO ELIMINATE END-PLAY IN FEED SCREW ASSEMBLY. BACK-LASH CAN BE TAKEN UP INSTANTLY

2 AND — TALK ABOUT LARGE OFFSET! OUR SMALLEST MODEL HAS ¾ IN. OFFSET AND OUR LARGEST MODEL HAS 4½ IN. OFFSET.

ALL in 1 Toolhead

BORING
FACING
TURNING
GROOVING
UNDER-CUTTING



A Model For Any Size Machine

PLUS-

POWER FEED for FACING and GROOVING

Think THAT Over!

WRITE for our New Catalog with complete information and prices!

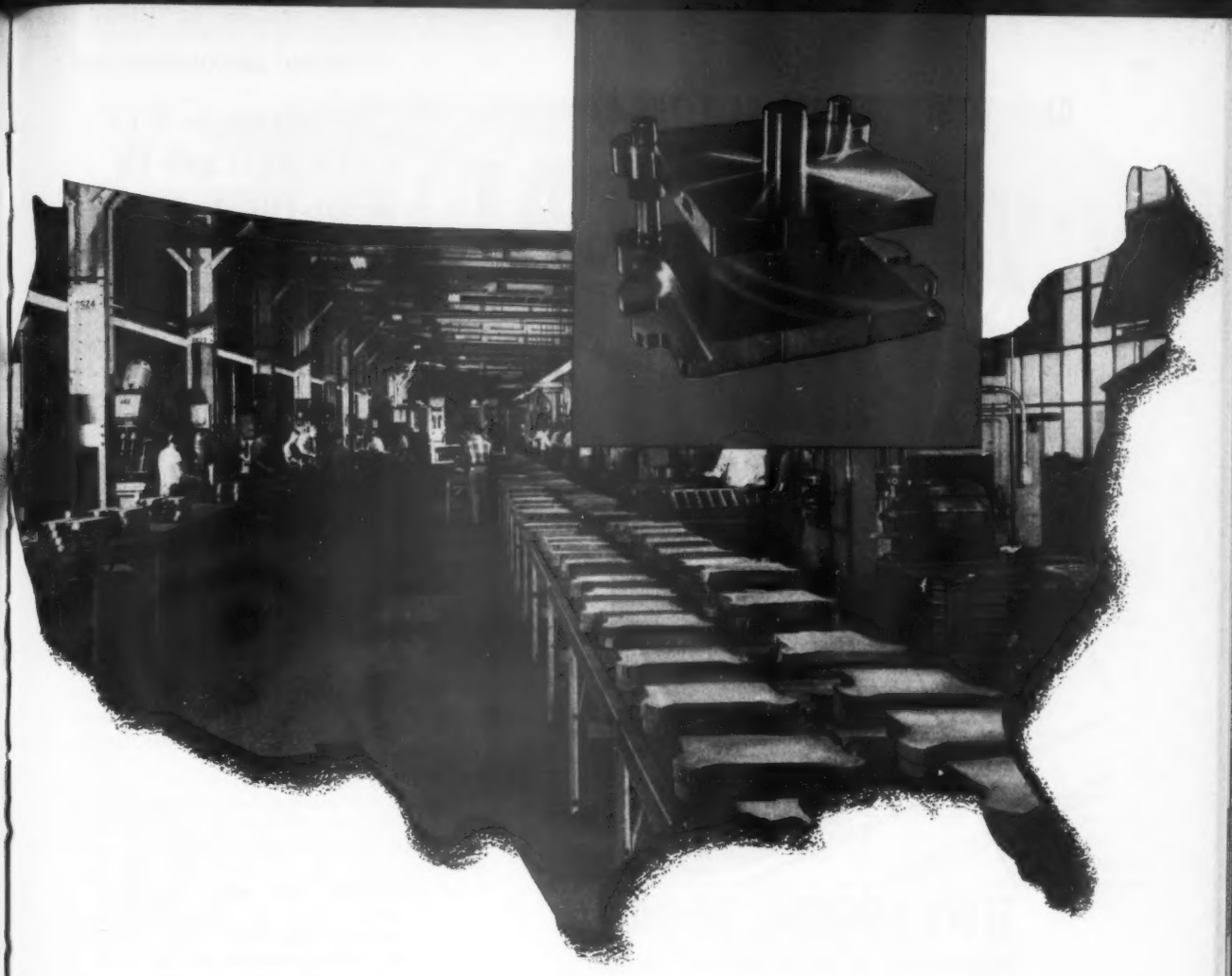
CHANDLER TOOL CO.
Muncie, Indiana, U. S. A.

A Boring Head That Won't Face is NOT Complete

Chandler-Duplex

COMBINED BORING AND FACING TOOLHEADS

CIRCLE INFORM-A-GRAM KEY NO. 42



Here's the "how" of the fastest Die Set Service ever

FIRST, Danly is able to apply mass-production efficiency in manufacturing high precision, *interchangeable* die set components to the traditional Danly quality standards. **SECOND,** each Danly Branch is stocked with thousands of these *interchangeable* die set components, for immediate assembly to meet your tooling requirements. **THIRD,** Danly Branches are strategically located throughout the United States in major toolmaking centers to give you quick, local delivery. So, when you want the finest die sets in the shortest time . . . just call your nearby Danly Branch.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Ill.

Which Danly Branch is closest to you?

BUFFALO 7	1807 Elmwood Avenue
CHICAGO 50	2100 S. Laramie Avenue
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DETROIT 16	1549 Temple Avenue
GRAND RAPIDS	113 Michigan Street, N.W.
INDIANAPOLIS 4	5 West 10th Street
LONG ISLAND CITY 1	47-28 37th Street
LOS ANGELES 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
PHILADELPHIA 40	511 W. Courtland Street
ROCHESTER 6	33 Rutter Street
ST. LOUIS 8, Mo.	3740 Washington Blvd.
SYRACUSE 4	2005 West Genesee Street

DANLY

DIE SETS . . .
STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES

ONLY DIEBEL PRESSES HAVE THE EXCLUSIVE

CYLINDRICAL RAM

STOPS ABNORMAL DIE DULLING

Misalignment of punch and die because of inadequate gibbing is the major cause of abnormal die dulling and short die life. The V-shaped gibs on conventional presses do not offer enough guiding surface, regardless of length, to assure positive alignment in day in day out mass production.

Diebel's cylindrical ram design affords maximum guiding surface and guarantees accurate punch and die alignment.

The exclusive cylindrical ram is another proof that DIEBEL PRESSES are designed, engineered and built with the die in mind.

DIEBEL HI-PRODUCTION AUTOMATIC PRESSES

Compare the tremendous amount of precision guiding surface of the cylindrical ram with the V-shaped gibs that guide the ram on conventional presses.

DI MACHINE CORP.

2708 W. IRVING PARK ROAD • CHICAGO 18, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 44

Quoting Is Key To Success In Tool-Die Business

"It's the quoting that makes or breaks tool and die firms or any similar subcontracting operation," Richard F. Moore, president of the Moore Special Tool Co., Inc. told a Better Management Forum recently sponsored by the Central Connecticut Tool and Die Industries.

Shop owners in the tool and die field were advised by Mr. Moore to estimate job hours first, not dollars, in their quoting. The Bridgeport manufacturer pointed out that estimates should be made by two men, one of whom should be the shop foreman or the man responsible for producing the job. He suggested that young shops start keeping records or histories and have them available as an aid in future estimating.

Quotations should be made on the production of an average man and should not be shifted to a different basis for each new order, Mr. Moore continued. Tool and die firm heads can learn a great deal by analyzing their sales to find their most profitable or best customers in the type of business most valuable to the company. He emphasized that tool and die operations must be flexible and ready for serious business adjustments. By knowing its overhead rate, which should be an almost constant percentage of sales, a tool and die firm can still make money on far less sales volume, he added.

The case histories of several tool and die firms that have grown in the Central Connecticut area were analyzed by a second panel member, John H. Peterson, CPA and a partner of Burns & Whittlesey. He presented the following points as the avenues to success:

1. Obtaining knowledge of actual costs in order to operate profitably.

2. Keeping a close watch on the overhead factor and considering it carefully in quoting.

3. Developing customers in various industries; thus, avoiding putting all eggs in one basket.

4. Watching expansion of business very closely to avoid ill effects of overnight mushrooming.

EFFECTIVE- EFFICIENT* aye, and ECONOMICAL, too!

PARALLOC Dial Snap Gages

With a remarkable new type of pin locking mechanism that minimizes "out-of-parallelism" between anvil faces. "L" Type fully encased, with set-back indicator and handle, permitting entry into narrow recesses. Wide choice of indicators as for "D" Type.

PATENTED

"L" (LEVER) TYPE

8 SIZES, each with ½" range, cover over-all range 0" to 4"

"D" (DIRECT) TYPE

8 SIZES, each with 1" range, cover over-all range 0" to 8"

DIAL Bore Gages

10 SIZES

cover range from

1/8" to 24"

PATENT APPLIED FOR

Three new models extend dial bore gaging range by intermediate steps down to ⅛" diameter. Each utilizes STANDARD's new, highly practical CENTERING-SIZE DISC principle. Simple in design, easy to set, easy to use; amazingly accurate and effective in small bore gaging.

DuBo Plug Gages

PATENTED

Whether handle will drop freely or not shows "Go" or "NoGo". Finger-tip operation reveals internal bore conditions by sensitive "feel". Tells more, more easily, than ordinary plug gages.

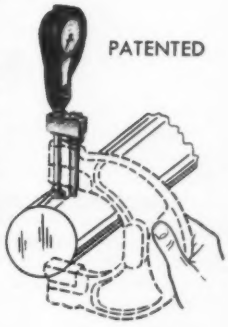
SINGLE END
Sizes over 1.510"

DOUBLE END
Sizes under 1.510"

Dializers®

STANDARD's original device for converting AGD Adjustable Limit Snap Gages to *DIAL* Snap Gages. Wide range of indicators from 1⅛" to 2¼" diameter, graduations of .001", .0001", .0005" and .00025", and a wide variety of dial markings, including metric.

Available separately for your frames or assembled in AGD frames supplied by us.



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DIAL INDICATORS

A complete range of sizes and mountings, with any desired graduation; regular, metric or Decimatic . . . all completely shockproof.

*** EFFICIENCY**
- EASE OF HANDLING
- EASE OF READING
- LONG SERVICE LIFE
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Write for "NEWS"; get full details of new STANDARD instruments that speed production and save you time, money and worry.

STANDARD Gage Co., Inc.
Poughkeepsie, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 45

NOTICE

TO AIR FRAME AND ENGINE BUILDERS, DESIGNERS, ENGINEERS AND THOSE RESPONSIBLE FOR PRODUCTION

THE BATH RADIAL DRAW FORMING PROCESS
has proven these advantages in the production of parts:

1 **Reduces Weight while Adding Strength**
The Priceless weight on wings

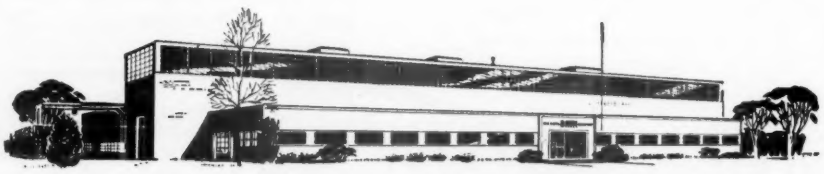
2 **Conserves Supply of Strategic Materials**
Makes no chips but holds Machining Tolerances

3 **Produces Parts in Minutes that now take Hours**
In steel or aluminum alloys

4 **Makes Large and More Complex Parts, thereby reducing Joints**
Works in either sheet or aluminum alloys and produces shapes up to 360°, either circular or rectangular with changing angles

5 **Imparts Constancy to Metallurgical Qualities**
Reduces the need for stress relieving

Backed by millions of dollars of equipment in use
and 40 years experience in the Metal Forming Field.



THE CYRIL BATH COMPANY

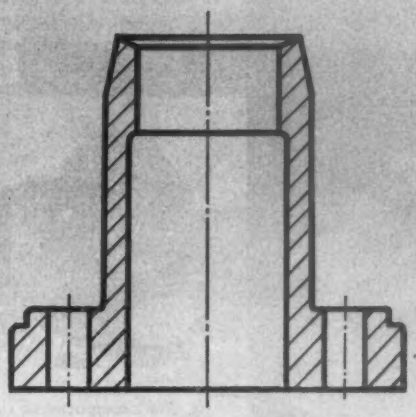
32380 Aurora Road • Solon, Ohio
(Located in the Greater Cleveland Area)

MANUFACTURERS OF RADIAL DRAW FORMERS • DIES • TOOLS •
PRESS BRAKES • TANGENT BENDING SEQUENCE PRESSES • PRESS TYPE BRAKES • SPECIAL MACHINES

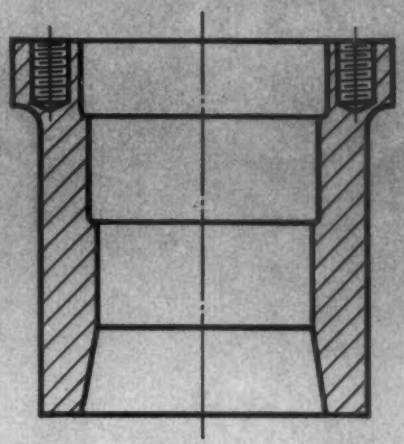
CIRCLE INFORM-A-GRAM KEY NO. 46

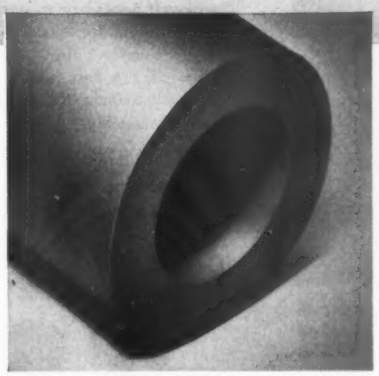
HOW TO MAKE RING-SHAPED TOOL STEEL PARTS FASTER AND EASIER

FORMING AND PIERCING DIE



BLANKING AND FORMING DIE





Graph-Mo Hollow-Bar comes in sizes from 4 to 16 inches O. D. with various wall thicknesses. Immediate delivery on many sizes from warehouses of the distributors, A. Milne Co. and Peninsular Steel Company.

New GRAPH-MO HOLLOW-BAR® eliminates drilling— and machines 30% faster

YOU can eliminate the time-consuming drilling operation when you make ring-shaped tool steel parts from Graph-Mo Hollow-Bar®. The hole comes ready-made. First step is finish boring. There's less scrap, and you use less steel.

On top of that, the rest of the machining's faster—30% faster, compared to other tool steels. That's because Graph-Mo has free graphite in its structure. It means less tendency to pick up, scuff and gall, too.

That same graphite plus diamond-hard carbides give Graph-Mo amazing wear resistance. Users have written us that Graph-Mo outwears other tool steels, on the average, three to one!

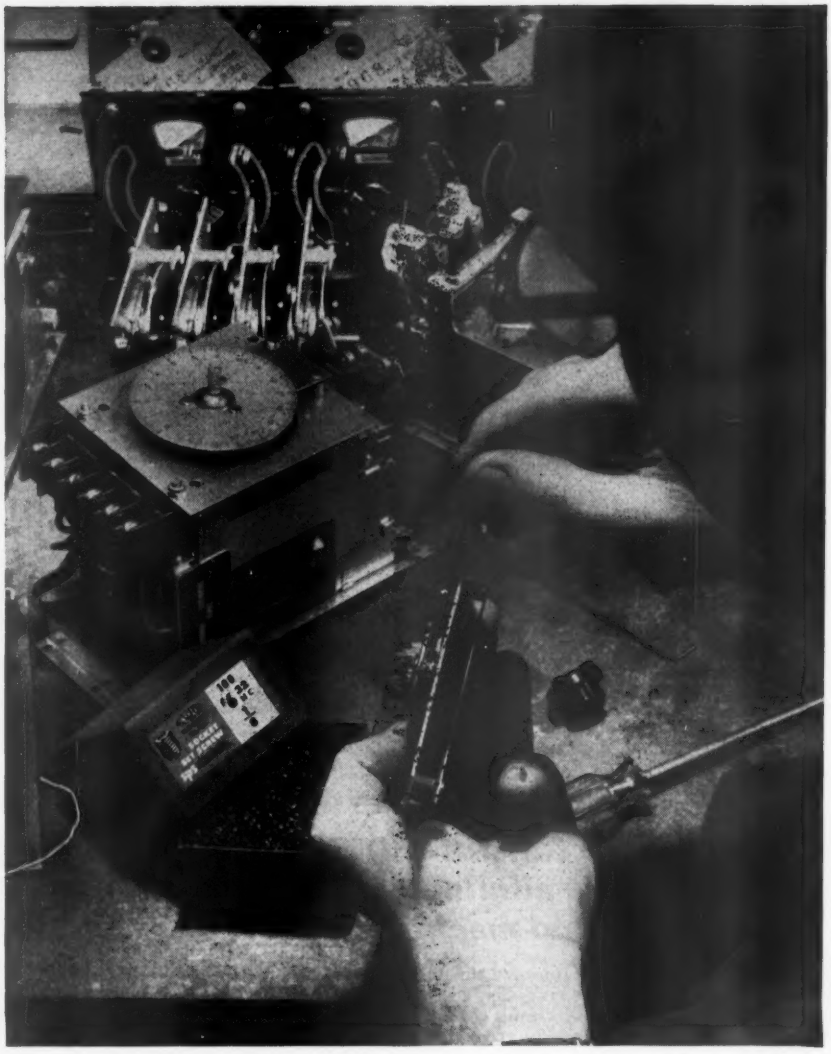
Graph-Mo responds uniformly to heat treatment. And no other tool steel is as stable. Proof: after 12 years, a typical Graph-Mo steel master plug gage changed less than 10 millionths of an inch in dimension!

More facts about Graph-Mo Hollow-Bar? Write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

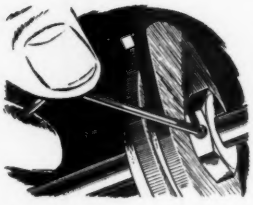
SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

CIRCLE INFORM-A-GRAM KEY NO. 47



UNBRAKO **Self-Locking Socket Set Screws** are used to hold the Vernier-Set or Cycle-Progress cam on the shaft of this precision timing device. Once they are tightened, they maintain the accurate setting so important to the operation of the instrument.

Because they are so tiny, the UNBRAKO set screws are picked up and started in the tapped hole with the long arm key.



The compactness of the design of the timing device makes it necessary to turn the screw in prior to assembly. The uniform depth and size of the hex socket permit maximum torquing, speed assembly.

UNBRAKOS—made of heat treated alloy steel—have fully formed threads, Class 3 fit; have knurled cup point for positive locking. Are available in standard sizes from #4 to 1".

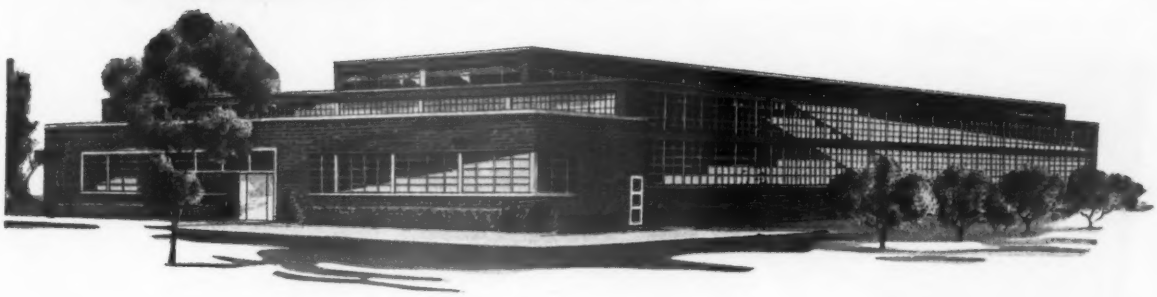
You can lower your inventory by using UNBRAKO Standards—stocked by your distributor

You'll have less money tied up in inventory, you'll get personalized service, faster deliveries. In addition, you'll reduce assembly time and increase production with these precision industrial threaded fasteners. Write for UNBRAKO Standards—a complete listing of socket screw products made by SPS and stocked by your local distributor. STANDARD PRESSED STEEL Co., Jenkintown 36, Pa.

UNBRAKO® SOCKET SCREW DIVISION SPS JENKINTOWN PENNSYLVANIA

CIRCLE INFORM-A-GRAM KEY NO. 48

to Satisfy your needs



we're doubling our productive capacity for special production machines

- **with the finest, most modern plant of its kind**
- **with the last word in modern equipment**
- **with a greatly expanded inspection program**
- **with this positive assurance to you**

faster, more economical production

Michigan DRILL HEAD CO. Detroit 34, Michigan

engineers and manufacturers of production machines and drilling equipment

CIRCLE INFORM-A-GRAM KEY NO. 49

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Capsule description of current literature. Bulletins, brochures, catalogs and circulars — You name it.

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Need help in any aspect of modern metalworking? See this section for materials and design aids, inspection and production techniques.

PROGRESS ON PARADE 116
Check this carefully. It can bring new efficiency to your operation. This newest in machines, tools, and accessories.

it's easy to bend with
diacro
precision bending machines
"it's easy to bend"
a new practical 32 Page
diacro
BENDING MANUAL
by the originators of "Die-less Duplicating"
This instructive and authoritative booklet will quickly prove itself indispensable wherever bending is done or is needed. It brings you a veritable gold mine of tested, authentic bending methods applicable to any rotary type bender. The proper bending technique may frequently offer a new approach to an old problem by simplifying product design and cutting production costs.
The exact methods of producing various types of bends in a wide range of materials are illustrated, step by step, with over 90 diagrams and charts together with valuable tooling suggestions.
You'll want a copy . . .
Mail your request today.
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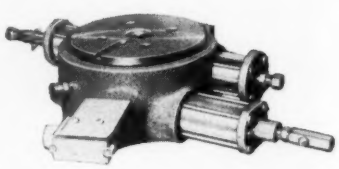

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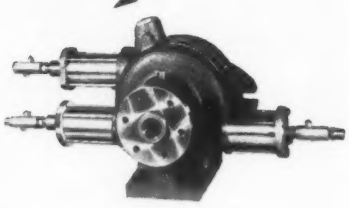

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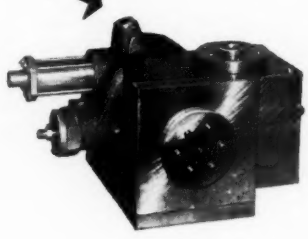

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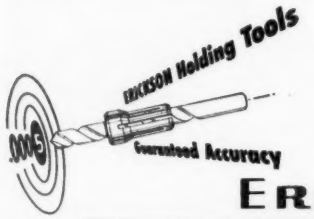

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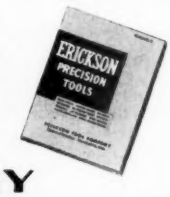

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CIRCLE INFORM-A-GRAM KEY NO. 52

what price machine tools?

Machine tool prices have appeared as a rather prominent subject in the column of the business press. The implication is made that machine tools are not only high priced but are over-priced.

We do not believe that the machine tool industry, in the face of a buyers' market, can be so naive or short-sighted as to indulge in the economic phantasy of over-pricing, which could lead only to self destruction.

The principal incongruity in the picture is the difference between building machine tools and using machine tools. Machine tools, constantly undergoing improvement and with greater built-in capabilities, are put to work so that more can be produced at lower costs. More what? More mass-produced items for mass-consumption markets. Machine tools, themselves, are far from mass-produced items; neither do they go to a mass-consumption market.

In other words, machine tools, and the improvements that have evolved in machine tool design and performance, have been sparked by the use of machine tools, not the building of them. Actually, the machine tool builder is, perforce, a relatively minor beneficiary of his own ingenuity and progress.

Admittedly, more rugged machines, along with higher speeds and feeds, are used by the machine tool manufacturer. In this respect he benefits by his own acomplishments. However, more and more, the machines he is today called upon to build for others are equipped with magazine feeds, automatic cycling, automatic loaders and unloaders — all destined to fill the demand for turning out more and more mass-produced items at lesser and lesser costs.

Take a centerless grinder rigged up with the latest feeding, handling, and conveying mechanisms, to the tune of putting through six hundred pinion shafts per hour. Wonderful! — for the automotive, refrigerator or outboard motor industries. Many machine tools incorporate pinion shafts in their anatomy, but what, in the names of Del Harder and other proponents of automation, would a machine tool builder do with a machine having an output of six hundred pinion shafts per hour? In a few hours he would be up to his ears in pinion shafts and the machine would be in dead storage most of the time.

Machine tool building is a job shop type of operation involving the highest and costliest of skills applied to relatively small lot manufacture. Hence, direct labor in the building of machine tools is a tremendously greater factor per pound or dollar of product than in those industries engaged in mass manufacture.

Surely, this is an incongruity of the highest order. The machine tool builder knocks himself out devising ways and means of cutting down the direct labor involved in mass production while he, himself, is unable to benefit by all of the labor saving innovations he researches and develops for his customers.

Again, and admittedly, machine tools are high priced if you want to consider them as museum pieces. But how do you arrive at a high price for a self-liquidating and profitable investment? A machine tool is a producer, not a consumer; an earner, not a charity case.

Don't forget, on the basis of price tag alone, and in spite of the amount of direct labor that the automated machine tool has taken out of the building of automobiles, that today you pay more dollars for a Ford than you did for a Cadillac a few years ago.

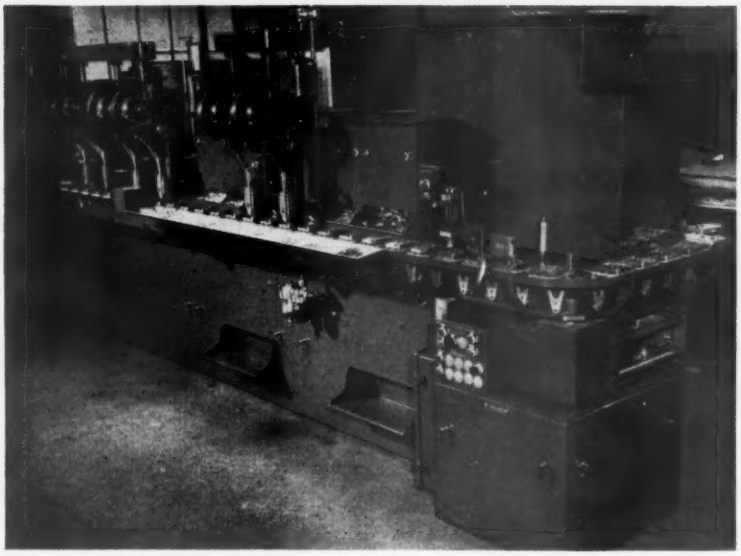
Further, as to the charge that machine tool builders are over-pricing their product, doesn't our system of free enterprise make that most improbable? Is there a machine tool builder who isn't up against tough competition? Not only does lathe builder compete against lathe builder, but the milling machine manufacturer has to buck methods competition from the broaching machine manufacturer. What room does that rugged but healthy situation leave for unrealistic prices?

Today's greatest market for the machine tool builder is the production modernization that is faced by the metalworking industries. Those manufacturers who modernize in order to compete successfully for the consumers' dollars will be privileged by the working of the immutable laws of economics, to continue in competition. Those who don't modernize their machines and methods will find themselves out-produced, out-sold, and then just plain out.

Can it be that a major portion of the current propagandizing against machine tool prices is a sort of "Custer's Last Stand" against modernization — by those who are unable or unwilling to see the light of progress?

E. Willard Pennington

editor



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REPLACES GENEVA DRIVE IN MULTIPLE STATION TRANSFER MACHINE!

There is no place for the geneva drive in AUTOMATION . . . at least not in the straight line machines (illustration) of the nation's largest manufacturer of automotive electrical components. Geneva drives can't keep pace with modern production methods . . . in fact, **they actually create a bottleneck in the assembly line!**

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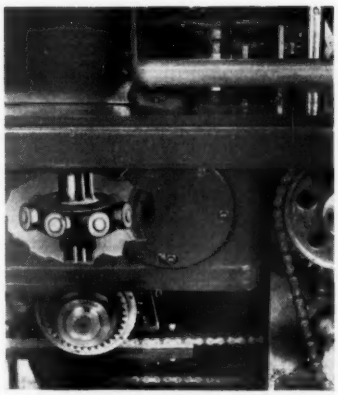

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CIRCLE INFORM-A-GRAM KEY NO. 54

Helical Carbide Cutter Design Speeds Metal Removal

TOOL DESIGNERS have long known the advantages of a true helical flute design. Since the included cutting angle (axial plus radial) is constant over the full length of the flute, the chip load is uniformly distributed. This constant included cutting angle produces a shearing cutting action, reducing impact and chatter and lessening the danger of crumbling the cutter tooth. High speed steel cutters with true helical flutes have been used advantageously for years. Carbide-tipped tools have also increased in use year after year.

The next obvious step in cutter design was to combine the two — the hardness of carbide with the efficiency of a true helix flute design.

The tool designers' first attempt to accomplish this was to make a straight tooth, carbide-tipped cutter and grind in the helix. However, this method was far too expensive. It was also limited by the thickness of the tips vs the progression of the helix angle. The next attempt was to mill a helical flute in the cutter body and braze segments of carbide side-by-side in the tip pocket. Although used quite extensively for some applications, this method is not practical because of the high cost of producing the cutters. The tips also shift during the many brazing operations. Pre-formed blanks have also been tried but cost again proved prohibitive for the ordinary application.

Results now being obtained with true helical carbide milling cutters far surpass performance experienced with high speed steel or straight-tooth carbide-tipped cutters. In some applications where operating conditions were such that maximum use of these cutters could be realized, as much as 3 to 10 times more metal has been removed. Finishes too, are improved. Finishes of 20 rms and better are not unusual. These advantages and others discussed here are reasons why the new helical carbide milling cutters are paving the way for tremendous new advances in machining.

New Method Applied To Old Idea

The new twisting method involves the use of a one piece carbide blank, usually the STB style or a rectangular blank, which is heated to the ductile temperature. This temperature is approximately 2350° F, and is the temperature at which the cobalt binder flows slightly. Both helix and camber are put into the blank simultaneously under a flash of heat by the use of proper fixturing.

Although Sonnet Tool and Manufacturing Company was the first company to produce a standard line of true helical carbide milling cutters, using one piece carbide tips, bent and twisted simultaneously into a true helical shape, the first work was done by Boeing Airplane Company.

The first Sonnet cutter, an integral shank end mill, was produced late in 1952. Since then, heavy duty slab mills, shell mills, spar cap cutters, stagger and interlocking side cutters, and a line of heavy duty and regular duty end mills have been developed by Sonnet as standard tools, identified as Helicarb True Helix

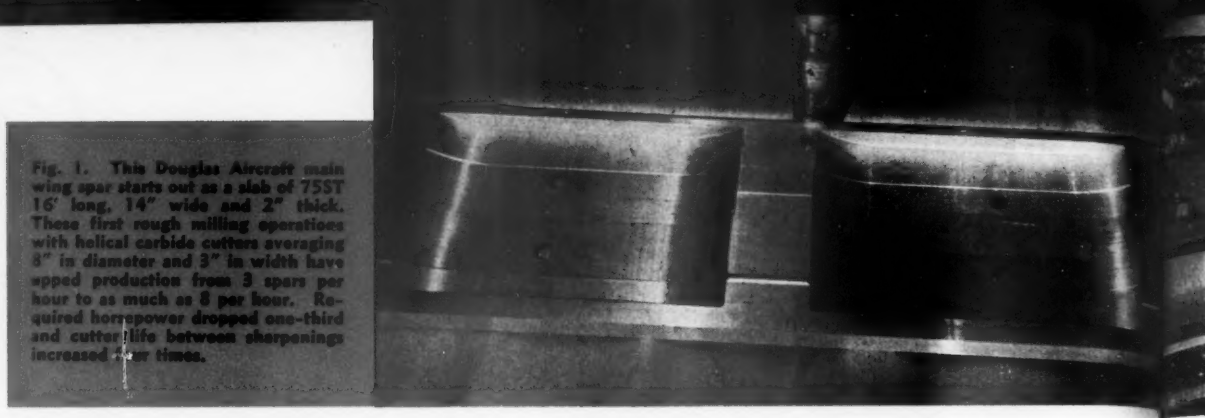


Fig. 1. This Douglas Aircraft main wing spar starts out as a slab of 75ST 16' long, 14" wide and 2" thick. These first rough milling operations with helical carbide cutters averaging 8" in diameter and 3" in width have upped production from 3 spars per hour to as much as 8 per hour. Required horsepower dropped one-third and cutter life between sharpenings increased four times.

Carbide Cutters. The heavy duty Helicarb cutters were designed for use with 10 hp mills or greater. Regular duty helical carbide cutters were developed for mills under 10 hp. Sonnet's success at solving the tool manufacturing problems has brought others into the field, giving evidence that these new cutter designs will be used more and more in the nation's metalworking plants.

First Used In Aircraft Production

As far as can be ascertained, the aircraft companies were the first to put helical carbide cutters to work because of their need for heavy stock removal combined with good finish on non-ferrous materials. Many of the more recent ships are designed with integral skin and rib construction which means that milling from solid plate must be done. Secondly, the aircraft companies were quick to take advantage of the helical carbide principle because they had the proper heavy equipment to drive these tools, such as the multiple head Farnam and Onsrud mills as well as good 25 and 50 horsepower production mills.

Tool engineers at the Douglas Aircraft Company's El Segundo, California, plant, have been very alert to put these new cutters to work wherever they could be used to advantage. One application is the milling of a main wing spar cap, Figure 1. The material is 75ST. A Farnham, double spindle milling machine with 40 hp at each spindle is used. The helical carbide cutters have an average diameter of 8" and average width of 3". All cutters have the standard (dural) 25° true helix angle.

With former methods they were getting three spars per hour. Now, using helical carbide cutters, they are milling 6, 7, and even 8, per hour. Horsepower requirements have been decreased one-third. Improved finishes have reduced hand finishing to a minimum. Life of the cutter between resharpening was increased four times.

Douglas is also using helical carbide cutters in a routing operation, (Fig. 2), on the main wing spar of a new model. A Cincinnati High Speed, High Cycle Hydrotel, Figure 3, is used with helical carbide two-flute end mills. Spindle speed is set at 7200 rpm. Feed is 40-60 inches per minute. Cut depth is 1¼"; width ½". Cutter diameter is 1⅜", with 2½" flute length. Complete performance reports are not available at this time.

Tool engineers for Douglas, El Segundo, believe that with proper equipment production increases of 50% and even 100% are possible. And with efficient use, materials up to 300,000 psi can be worked successfully.

Goodyear Aircraft Corporation, Litchfield Park, Arizona, recently investigated helical carbide milling cutters for cost and performance on straight spar milling operations, Figure 4. As a result of the investigations, they ran an 8" diameter Helicarb slab mill 4" wide, on a trial basis. Their former method of milling spars, used a pair of straight tooth, carbide insert cutters, running side-by-side on the same arbor. This setup had to be ground on the arbor on which it was to run to prevent a step in the resulting cut. Even then the cutters

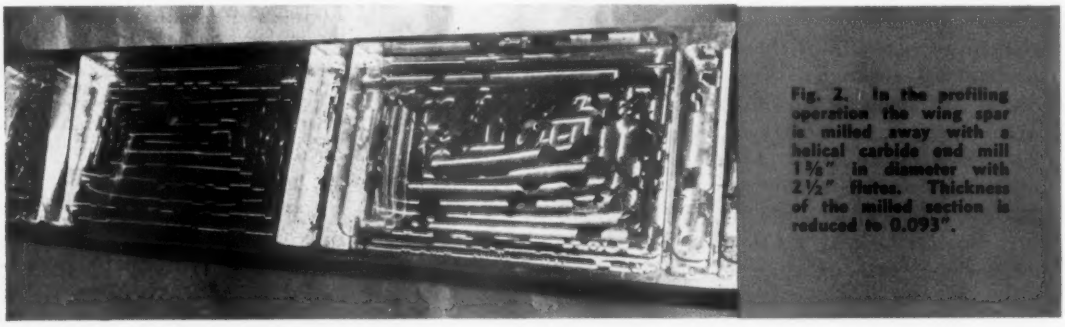


Fig. 2. In the profiling operation the wing spar is milled away with a helical carbide end mill 1⅜" in diameter with 2½" flutes. Thickness of the milled section is reduced to 0.093".

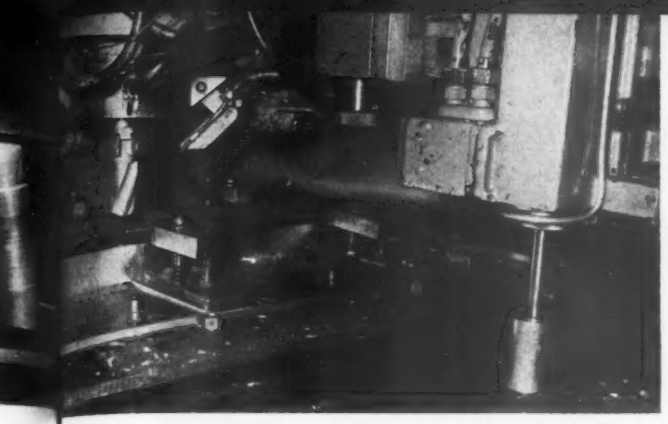


Fig. 3. The job shown in Figure 2 is run on this Cincinnati High Speed High Cycle Hydrotel in the El Segundo plant of Douglas Aircraft. Close-up of cutter and tracing stylus.

would change position during a fairly heavy or plunge-type cut. Removing the step on the finished part required a hand operation costing a considerable number of man hours.

The use of a single helical carbide cutter has eliminated the step and produced over-all finishes which cut hand finishing to a minimum. According to the Goodyear Aircraft report, the helical cutter also requires resharpening less frequently. Re-inserting, if required, is somewhat more difficult than with straight tooth tools. It also follows that, total grinding time per part is less, resulting in less down time due to changing cutters. (A grinding master is preferred for proper finish grinding of the face.) Production per man mill hour has also been increased by the use of these cutters, since a much higher rate of feed can be used, resulting in a better surface finish. This is an advantage not possible with any other cutting tool.

Goodyear Aircraft tool engineers who tested the Helicarb cutters say that the 25° true helix angle now made possible with this new design is responsible for their successful use of the cutters. Their experience shows that a 15° helix angle ground from a solid carbide tip does not produce the same results.

The three types of cutters originally tested by the San Diego plant of the Convair Division of General Dynamics in conjunction with Sonnet Supply Company are now being used in production. To date such cutters, Figure 5, have minimized the resharpening time and have reduced the cycle cutting time for end milling 25%, slab milling 50%, and Farnham slab milling on T-29 Rails 57%. A more improved finish is being obtained (60 to 80 rms) and virtually all hand polishing for removal of cutter chatter marks is eliminated (saving about 11 hours) resulting in only the breaking of corners.

Helicarb spar mills produced 150 spars in 40 hours, while a straight-axial-tooth carbide cutter required 90 hours to produce 150 spars. According to Convair tool designers, the finish with the Helicarb cutter was considerably better, varying between 40 and 80 rms.

Convair, San Diego, has converted all new designs and some of its present spar-cap cutters over to helical design, both in the arbor and shank type cutters. In their general machine shop the application of a 2″ Helicarb end mill, Figure 6, reduced the machine time for one part from three hours each to nineteen minutes each.

Increasingly Wider Steel Application

Recently, more and more helical carbide cutters are being used with equally impressive results on steel applications. Their use for removing steel will grow due to the ever increasing demands for machining steels heat treated to tensile strengths above 200,000 psi.

Douglas Aircraft Co., El Segundo, for example, is using Sonnet's Helicarb helical carbide end mills to mill a boss on the arresting hook of the Navy A-4D. Before the development of Helicarb this was an impossible milling job because of the hardness of the material. Formerly the boss was ground in. The cut is a 0.150″ deep roughing cut on heat treated 4340 which Rockwells at 52C, 260,000 to 280,000 psi. The cutter is a 4-flute, 1⅜″ Helicarb end mill, used on a Kearney & Trecker 5 CSM, 25-50 hp dual range mill. Speed was set at 529 sfm with a 4½″ pmf.

Tests conducted with Helicarb cutters under ideal operating conditions by the Long Beach Naval Shipyard, Long Beach, California, show that for steel applications, more than one cubic inch of 2340 nickel steel alloy (Rockwell C28) per minute per horsepower can be removed.

Fig. 4. Goodyear Aircraft Corporation has reported outstanding performance from this "Helicarb" 8″ x 4″ slab mill running on an Onsrud Spar Mill. Among the gains made were: quality of machined finish which cut subsequent hand finishing to a minimum; less frequent sharpening; and an increase in production per man mill hour.

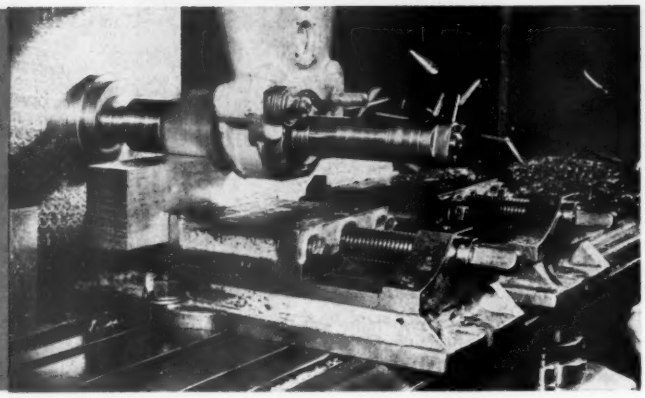


Fig. 5. In the San Diego plant of the Convair Division of General Dynamics this 4" diameter, 4" long, 6 flute, 15° "Helicarb" slab mill is climb milling at 1310 rpm with a feed of 44" per minute. It is taking a cut (dry) ½" deep and 3" wide in 75ST and producing a finish better than 100 rms.

In these tests a 3" Helicarb straight shank end mill and adapter was used on a 50 hp Cincinnati milling machine. It removed 61½ cubic inches per minute. Spindle speed was set at 416 rpm, table feed 19" per minute and cut depth 1 5/32".

The major immediate obstacle which hinders the wider use of the heavy duty cutters in steel applications, however, is the lack of milling machines with the proper amount of horsepower.

Extreme Rigidity A Must

In both steel and non-ferrous applications certain operating conditions must exist if the maximum use is to be made of helical carbide cutters. Of these, rigidity is the most important. The machine itself, table, spindle, knee and overarm supports should have maximum rigidity. On slab milling operations, outboard bearings should be the anti-friction type to absorb the radial loads. Double keys should be used for long runs. Fixtures should be designed with maximum cross sectional area to insure minimum deflection. For example, if normally ½" material for fixture is used, 1" material should be used if possible. Thin sections, webs, irregular contours, etc., should have maximum fixture support. Close fits should be maintained on arbors, adapters, shanks, etc., and the workpiece, fixture, etc., should be placed as close to the column as possible.

The operator plays an important part in getting the maximum use from helical carbide cutters. Speeds and feeds for these cutters are much more than the average machinist is accustomed to using for straight tooth, carbide-tipped or helical high speed steel cutters. When using these helical carbide cutters, the speeds and feeds given by the project engineer must be followed. The proper cycle which determines the optimum number of cuts per grind should also be followed closely.

Where possible horsepower meters should be used to determine the proper load for the horsepower available, and to determine when the tool is dull and pulling more horsepower than it should.

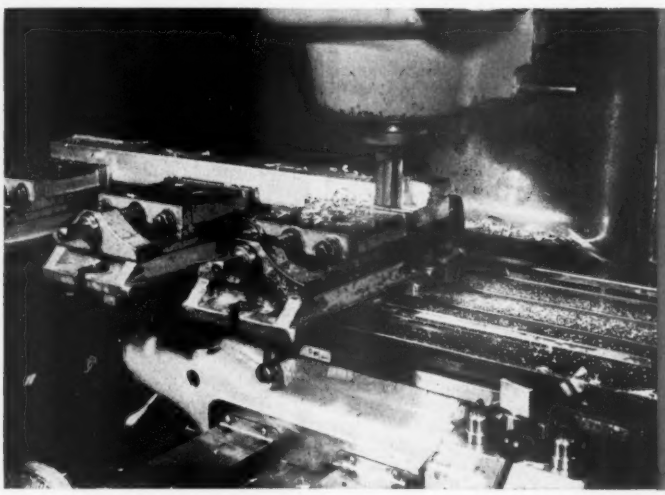


Fig. 6. Convair's general machine shop, using a 2" Helicarb end mill reported a reduction in machining time on this part of from three hours to nineteen minutes.

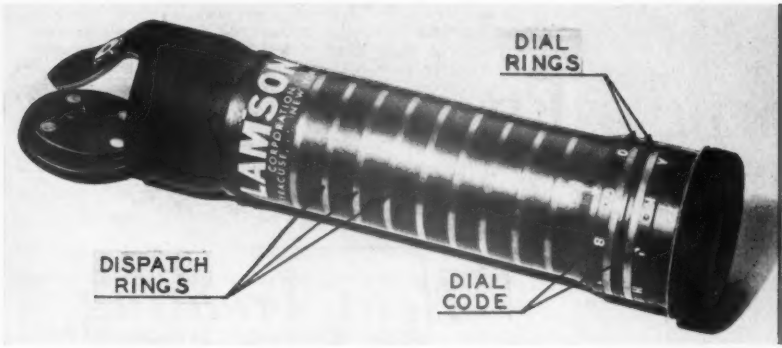


Fig. 1. Carrier dialing rings can be set for as many as 99 stations.

Photos courtesy Lamson Corporation

Pneumatics For In-Plant Communications

Fully automatic pneumatic tube systems are being used effectively in many plants for transporting messages, punch cards, small tools, laboratory samples, or other small articles from one point to any other.* The operation of the Airtube automatic switch system is very simple. All the sender has to do is to insert the material in the carrier, close the carrier, set the adjustable rings on the carrier to determine the desired destination, and place the carrier into the dispatch inlet. The carrier is then automatically dispatched.

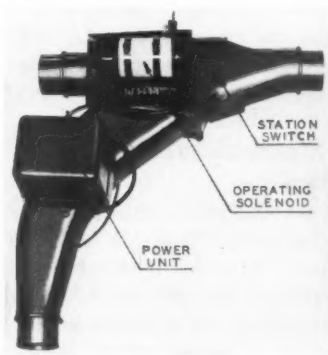


Fig. 2. One simple switch design is used for both line and station switching because wiring is localized for each station.

Two tubes pass each station—a dispatch tube to take away carriers sent from the station—a receiving tube to bring carriers to the station. When a carrier is dispatched in the sending tube, it travels to the carrier spacing device which spaces the flow of carriers into the receiving tube. As the carrier approaches its designated station, the rings on the carrier act as electrical contacts for the brushes in the flying selector and are the means for closing the contact. The proper contact in the selector energizes the Elektrigger power unit which triggers the switch impulse, and the carrier is switched out of the receiving terminal.

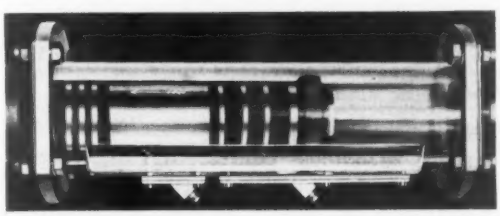


Fig. 4. Diagram and parts of the Lamson Airtube automatic switch system.

The electrical wiring for all stations is localized, which eliminates central wiring or indicating panel unit and reduces the number of pneumatic tubes for any given installation.

The automatic switch system arrangement makes it possible to send carriers from any station to any station.

*Also see T&P, Sept. '54, p. 136—"Airtubes Link Dispatch Outposts to Central Production Control Room."

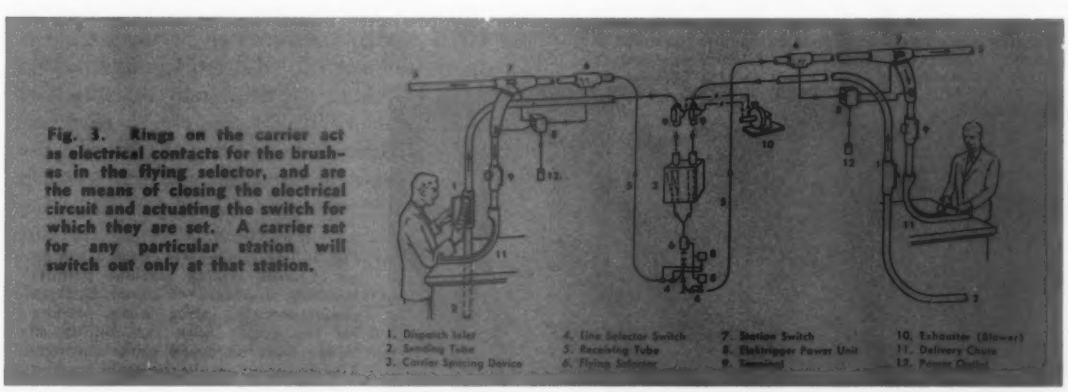


Fig. 3. Rings on the carrier act as electrical contacts for the brushes in the flying selector, and are the means of closing the electrical circuit and actuating the switch for which they are set. A carrier set for any particular station will switch out only at that station.

3 HOLDING FIXTURES for Milling Heat Treating Coining

by Herbert Chase, M. E.

▸ Magnetic Chuck Promotes Fast Milling

ONE DESIGN of gray iron castings used in business machines requires that one face be milled flat, after which the casting is turned over to mill the ends of flanges parallel to the first face. In one typewriter manufacturing plant, this milling is done rapidly on an Ingersoll machine, using the multiple setup illustrated in Figure 1. By using a magnetic chuck and a simple fixture holding 14 castings, loading time as well as cutting time is minimized.

For the initial cut, seven castings are placed on the chuck with the flange on each projecting into a slot between the edge of the chuck and a clamping bar. When the chuck is energized, the castings are clamped magnetically against its top face, after which screw clamps are tightened against the flanges. These clamps preclude any shifting or turning on the face of the chuck as the cut is taken by a 6″ cutter having inserted blades with carbide cutting edges. One roughing and one finishing pass complete machining of the top face.

All seven castings are then removed and each is turned over and is magnetically clamped in a wide slot at the opposite side of the fixture with the flanges projecting upward and against a fixed bar above which the flange ends to be machined project. This leaves the flange ends in a row and so held that the castings cannot shift when the roughing and finishing cuts are made by a 23″ cutter having inserted blades with carbide edges.

As there are seven castings at each side of the fixture, production is quite rapid and both the loading time and cutting time per piece are much less than for fixtures in which downward pressure has to be applied by hand operated clamps, and with the castings machined individually.

▸ Indexing Table Aids in Localized Hardening of Typewriter Parts

MANY PARTS for typewriters built in quantity by a large manufacturer require localized hardening. A case in point is a stamping of SAE 1050 steel called a cam lever. As 42 of these stampings are needed in each typewriter, the total production is quite large. These stampings are only 0.060″ thick and are quite irregular in shape. Specifications call for hardening the tip of the longest projection and the periphery of a hole through a flat portion at the opposite end.

To do this heat treating rapidly and economically, the setup shown in Figure 2 is employed.

Fig. 1. This magnetic chuck setup on an Ingersoll milling machine permits finishing one face of seven castings simultaneously (after initial loading for the cycle) with the milling of flange ends on seven other castings. The fixturing results in rapid loading and unloading, with cuts being made on 14 castings in each pass.

Fig. 2. (Right) This indexing table setup employs oxyacetylene flames for precise localized heating of two areas in each typewriter cam lever. Jets of water quench the heated areas immediately after each indexing. A production rate of over 6000 pieces per 8 hr day is attained.

It includes a horizontal indexing dial equipped with nine simple holding fixtures. Each of these is loaded by hand at a front station. Next to this station is a tote box of parts resting on the table that supports the heat treating unit above a water quench tank.

Near the back of the indexing fixture are two oxyacetylene torches that burn continuously while the unit operates. Indexing is automatically timed, of course, and moves the dial counterclockwise as viewed from above. Loading is done at the six o'clock position and the first torch applies its flame at about the two o'clock position. This flame is adjusted to apply just the right amount of heat to raise the periphery of a hole to quenching temperature during the short interval that the workpiece stops at this station.

As soon as this temperature is attained, the dial indexes rapidly and brings the hole under a jet of water applied from above. Thus, the hot area is immediately quenched. At this same 12 o'clock quench station there is a second flame adjusted to heat the projecting end of the workpiece, which is about 3" radially outward from the hole. When the tip reaches quench temperature, the stamping is indexed again and comes under a second jet of water, hence almost instant hardening results.

Further indexing to the 9 o'clock position brings the workpiece into contact with an ejector on a hinged lever that is elevated when a wheel on the outer end of the lever rides over a cam that is a part of each holding fixture. This ejector lifts the stamping free and it falls into the quench tank from which the stampings are removed at intervals.

Once the setup, including the flames, is properly adjusted, it operates automatically, save for hand loading of parts, and continuously for as long a period as required. About 6,000 to 7,000 stampings per 8-hr day are heat treated. This is faster than with the induction heating that was previously employed, and the new setup has the advantage of closer control as to areas heated. In addition, the new equipment is low in cost and is very easily adjusted to different parts because both the size and location of the flames are so easily altered to suit the particular parts in process.

Although the time for indexing and the corresponding dwell at each station can be altered if required, a single setting will suit several parts because it is so easy to alter the rate of heating by simply adjusting the gas flame. It is expected, therefore, that the same or similar setups will soon be used for many different parts.

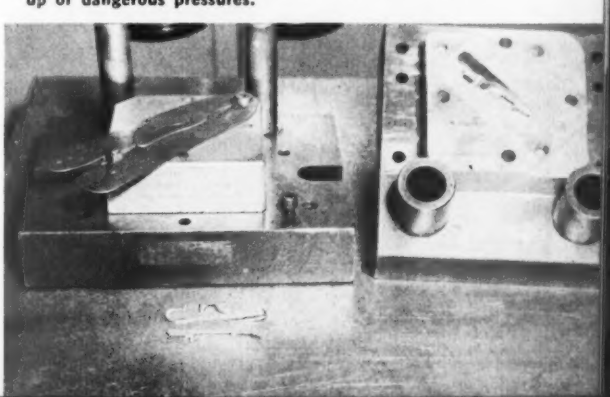
▸ Rapid Coining Done on Small Stampings

COINING OF SMALL STEEL stampings is not a very common operation, because the pressure required to flow metal cold is high and presses of large capacity are required. In one phase of business machine manufacture, coining is done on several small parts to provide bosses and to effect other thickness variations. At the same time, surfaces as smooth as those of the die are produced on the stamping and close limits on thickness can be held. These latter advantages sometimes avoid the need for grinding and, as the coining is a very rapid operation, considerable labor may be saved and may soon amortize the die.

In some cases, the boss or bosses produced are used only for location in subsequent operations and are trimmed off later. On other parts, the bosses provide hubs around holes or yield variations in thickness needed to satisfy

. . . *Continued on page 96*

Fig. 3. Bosses created by metal flow in coining may serve to locate workpiece in following operations. This die, run in a 150-ton Bliss press, coins the blank shown next to the die. Subsequently the blank is trimmed, drilled and formed to become the finished rachet-type counter clutch lever, foreground. Note the pivoted nest on the die which prevents the build up of dangerous pressures.



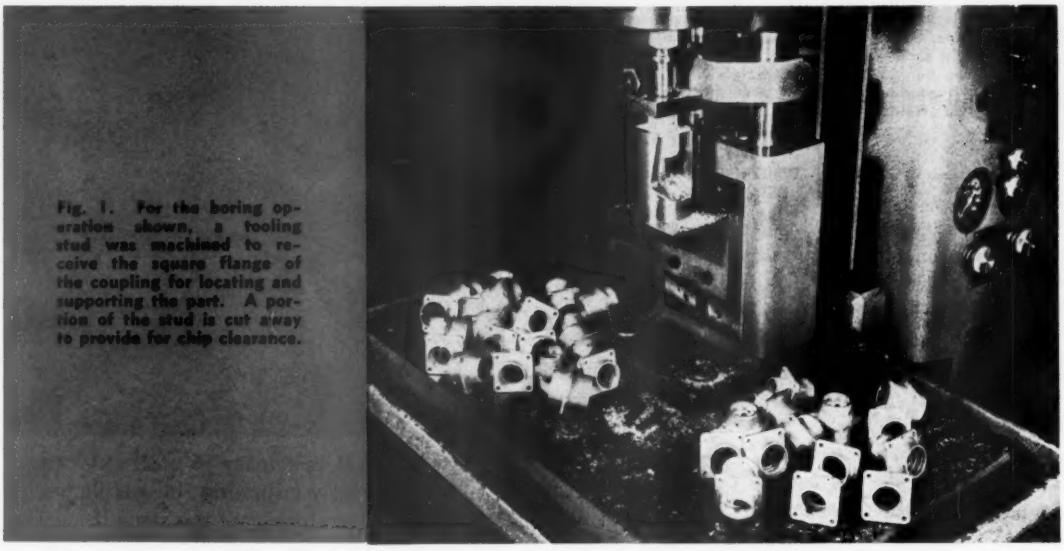


Fig. 1. For the boring operation shown, a tooling stud was machined to receive the square flange of the coupling for locating and supporting the part. A portion of the stud is cut away to provide for chip clearance.

AIR-OPERATED UNIVERSAL CLAMPING FIXTURE

EFFICIENT CLAMPING of workpieces for various machining operations is now facilitated by the development of a vertical air-operated clamping fixture, shown in Figures 1 and 2.

The fixture, built in two sizes, is made up of a base and column in which two guide pins, powered by an air cylinder, actuate up and down. A top plate is bolted to the upper ends of the guide pins by socket screws in such a manner as to permit its adjustment for height.

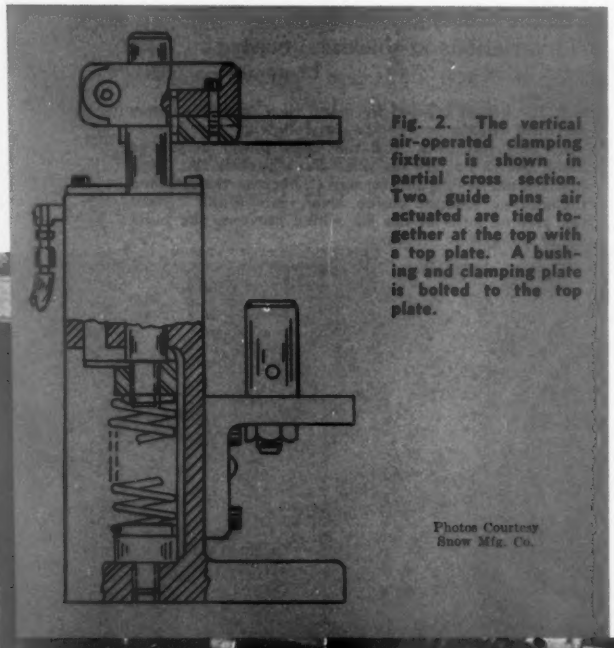


Fig. 2. The vertical air-operated clamping fixture is shown in partial cross section. Two guide pins air actuated are tied together at the top with a top plate. A bushing and clamping plate is bolted to the top plate.

Photos Courtesy Snow Mfg. Co.

An adjustable work table provides for clamping workpieces of various heights.

Both models of this fixture are air-operated. The smaller size develops 148 lbs and the larger 276 lbs clamping pressure, on 100 psi line pressure. A pressure regulator is built into the machine to provide adjustment of the desired clamping power.

The universal feature of these fixtures lies in the tooling studs, Figure 3, and in the bushing and clamping plates.

The tooling stud blanks can be machined with a double slot, Figure 4, for holding round stock, Figure 5, in preference to the usual "V" groove. This method allows a firm grip along the knife edges and gives better chip clearance.

The retaining walls project slightly above the centerline of the round stock thereby preventing any climbing action of the part during the break-through of the drill. This prevents excessive tool wear and breakage.

The stud blanks are provided in 1", 1¼", 1½", and 2" dia. sizes. To provide for adequate clamping strength, there is a choice of bushing and clamping plates of ⅜", ½" and ⅝" in thickness. In addition to a reamed dowel hole and two tapped holes for attaching this plate to the top plate of the fixture, the location for a drill jig bushing is spotted on these plates.

Nuts and bolts drilled for wire locks are used extensively in the aircraft industry. Figure 6

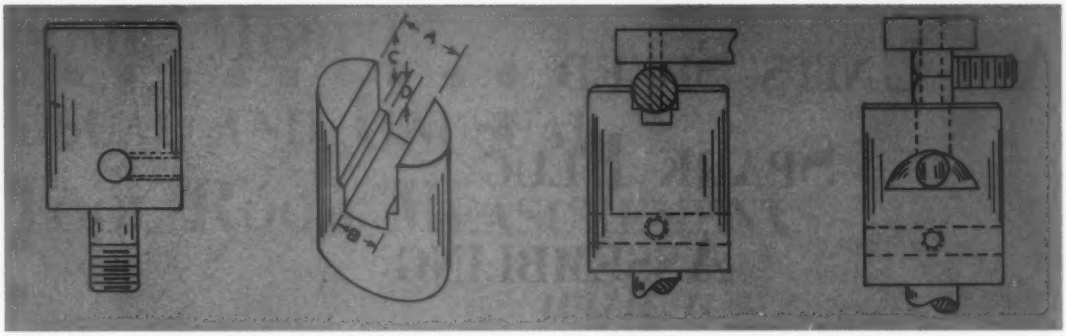


Fig. 3. From blank studs in 1", 1¼", 1½", and 2" dia. sizes, locating and holding components are machined for the particular operation to be performed. Fig. 4. An illustration of the double slot machined in a tooling stud for holding round workpieces during drilling. "A" = dia. of workpiece + 0.002"; B = ¾ x workpiece dia.; C = $\frac{\text{Workpiece dia.}}{3} + \frac{1"}{32}$; D = Dia. of drill + $\frac{A}{6}$. Fig. 5. Round stock is held firmly by the knife edges of a double slotted tooling stud. An additional advantage is the better chip clearance. Fig. 6. An illustration of the application of the clamping fixture for drilling nuts and bolt heads for wire lock purposes.

illustrates a typical setup for drilling bolt heads, using the universal clamping fixture. This tool stud was drilled through to the machined opening to provide for chip clearance.

A cross drilling operation performed on a shaft is shown in Figure 7. The tooling components consist of a standard stud and a bushing plate machined inexpensively to permit the insertion of the part into the fixture so that contact is made with a Micro-Switch. This arrangement provides an accurate and positive location, initiates the spindle cycle, and synchronizes the air-operated clamping action of the fixture. As soon as the cycle is completed, the part is ejected by the spring loaded contactor.

A similar type of tooling is shown in Figure 1. The operation performed is boring the ID of a flanged coupling. To provide for positioning and supporting the coupling, a tooling stud was machined to receive the square shaped flange and was also cut away for chip clearance. A hole was bored in the air-operated clamping plate in line with the center of the workpiece position, to permit the advance of the boring bar through the clamping plate to the workpiece.

A simple locator button used in conjunction with a "V" plate, Figure 8, constitutes the positioning arrangement for drilling the primer hole in a shell case. A drill jig bushing set in the air-operated clamping plate accurately guides the drill.

The work table can be adjusted in height to permit adaptation to larger or longer parts. This advantage can be seen by comparing the length of the setup in Figure 1 with the shell case.

Fig. 7. Cross drilling a shaft using a double slotted tooling stud for holding and locating the part, and the air-operated clamping plate for clamping. A drill jig bushing is accurately located in the clamping plate.

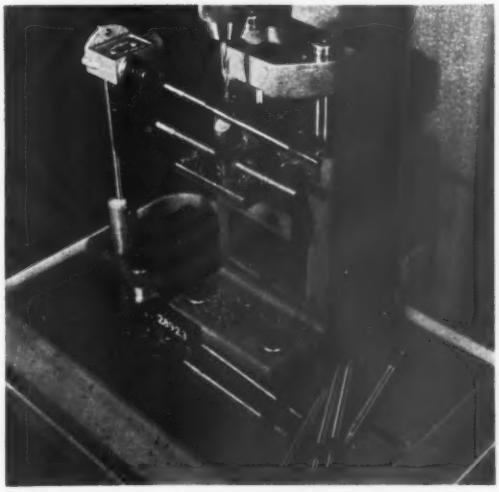
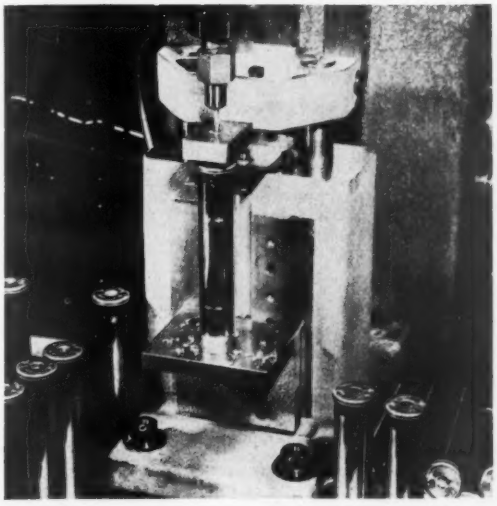


Fig. 8. A simple locator button used in conjunction with a "V" plate positions a shell case for drilling the primer hole.



AIR UNITS SPEED SPARK PLUG ASSEMBLING

Pneumatic and Electrical devices drive home locking nuts

AN INGENIOUS combination of electrical and pneumatic devices drives home the locking nut on Duchess spark plugs, with a minimum of time and effort. The machine was designed and built by Crusota Engineering Company of Springfield, Missouri, using standard Mead units.

Following is the operational sequence of the machine:

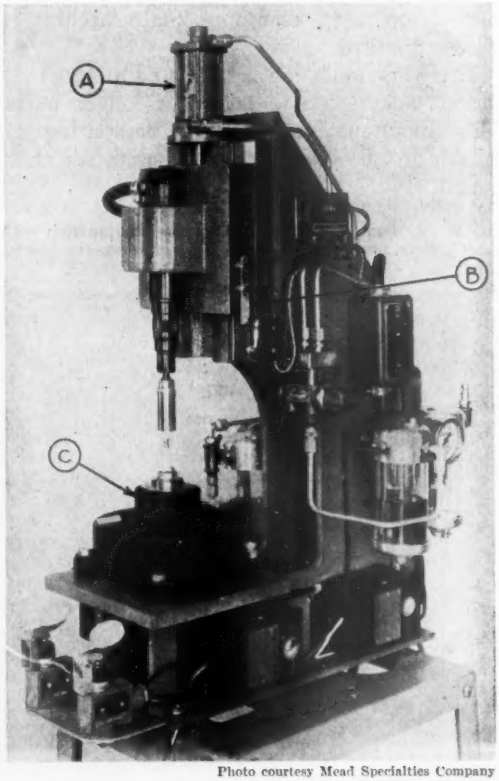


Photo courtesy Mead Specialties Company

1. Spark plug is placed in standard, air-operated LS-1 collet fixture (C).

2. Main air valve is opened to supply collet pressure (valve on opposite side of machine).

3. Micro-Switch on left is depressed, momentary contact, shifting 4-way double solenoid valve. Double acting F-175-S cylinder (A) moves dovetail slide, carrying nut setter toward plug.

4. Prior to setter socket engagement over hex nut of plug, cam finger (B) attached to dovetail slide trips Micro-Switch roller energizing two-way solenoid supplying air to nut setter (solenoid cannot be seen in photograph, being on opposite side of machine). Tripping of this Micro-Switch also starts timer motor.

5. Socket controlled by a built-in clutch. Timer is adjusted to allow air to setter only sufficient to throw clutch. Solenoid controlling setter air is then reversed by timer, freeing contact pressure between socket and nut prior to upward travel of socket.

6. Depression of Micro-Switch on right, momentary contact, shifts 4-way double solenoid valve. The same double acting cylinder moves dovetail slide upward to original position. Upward travel of slide removes cam finger attached to slide from Micro-Switch, de-energizing timer motor allowing for reset for next operation.

The 4-B bench valve is shifted, releasing the holding force in the collet fixture. A No. 183 air press stand is employed for basic machine member. The complete cycle time on this job is only 3 seconds.

SOME (MORE) USUAL AND UNUSUAL TOOL ROOM MEASUREMENTS with a Contour Projector*

by A. R. Fultz, EASTMAN KODAK COMPANY, Rochester, New York

HERE IS still another example of where the contour projector can aid in an actual tooling setup.

It was necessary to grind the ends of the pins, Figure 11, so that the outer diameter measured 1⅛" ± 0.0004" when the points just made contact. Also the two pins were to be of equal length to close tolerances. The springs attached to the pins are not pertinent to the problem except that they have to lie parallel to the axis of the 1⅛" diameter.

To grind the blunt ends of these pins, a long chucking block was made up in which a V slot was cut so that the pins could be cradled. A hole was drilled all the way through and locating dowels provided for positioning of the springs. With the two pins in the V slot and lightly clamped, the complete arrangement was placed on the contour projector with the projector light going through the hole in the block. A screen image of the two points along with their relation to the axis of the chucking block was readily seen.

First, the O.D. of the chucking block was centered on the screen. Then the points were adjusted until they touched each other exactly on the screen axis, Figure 12. Remember that both pins were to be the same length. In order to match the points, it helped to use a magnification of 50x.

By chucking the block in a small grinder and accurately trueing it by an indicator, it was possible to grind the pins as desired. Many uses of this principle can be found such as the grinding of radii on parts or tools which are not centered or which may have to be staggered when grinding.

The various examples of measurement that I have shown you up to now have all required the taking of one measurement at a time. However, there are many times in tool work when a number of identical parts must be made. Measuring each part is time consuming and there is always the question of reconciling the measurements of one part with an-

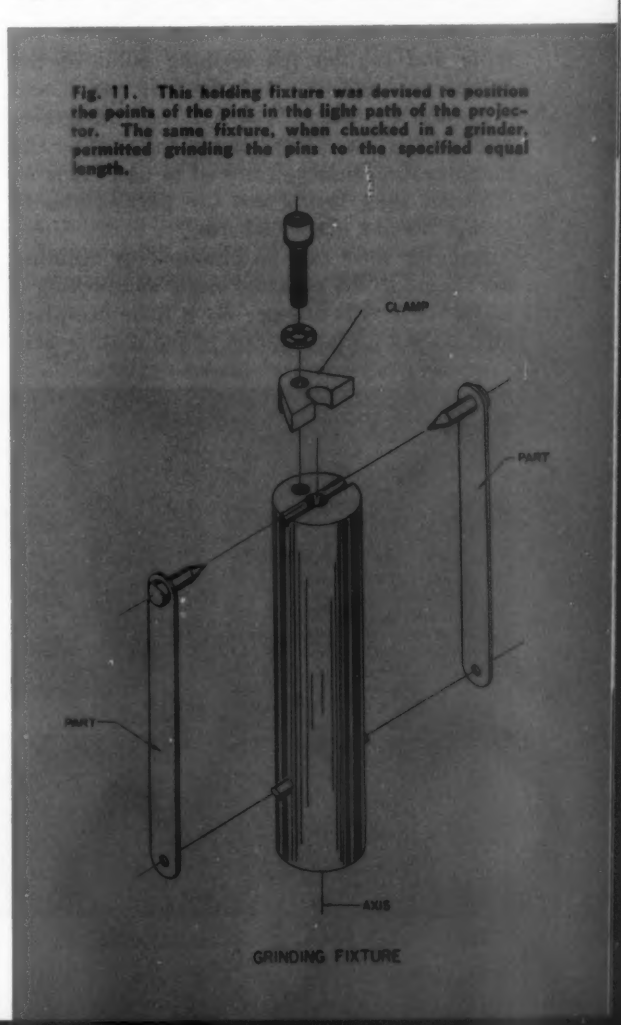


Fig. 11. This holding fixture was devised to position the points of the pins in the light path of the projector. The same fixture, when chucked in a grinder, permitted grinding the pins to the specified equal length.

*Adapted from an address by Mr. Fultz before the 1953 Convention of the National Tool & Die Manufacturers Association. Through the courtesy of the Eastman Kodak Company and the NTDMA, we present another portion of his talk. Some of his other examples of Tool Room—Contour Projector "tricks of the trade" were discussed in the October, page 72, and November, page 61, Issues. Ed.

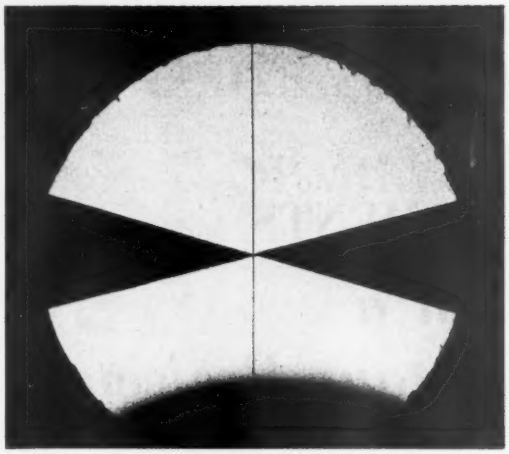


Fig. 12. The projected image of the pin points as it appears on the projector screen. For accurate matching of the points a magnification of 50x was used.

other. The obvious answer is to compare all of the parts with a standard outline on the screen to which they must all conform.

In other words, we need a screen chart. How are we going to make such a chart quickly in the tool room? If your projector has the screen vertical, it is easy to do right on the projector. Simply set a height gage on the table and replace the scribing point of the height gage with a sharp drafting pencil and draw the contour of the part on the screen, multiplying the dimensions of the part by the magnification that you intend to use. It is no different than laying out the part originally except it's to a magnified size.

Angular lines can be obtained by rotating the screen to the required angle and locking it while the line is drawn. By a little pre-planning on the initial location of the outline, arcs or circles can be obtained by holding the pencil point stationary and rotating the screen. For many purposes a chart drawn in this fashion is entirely satisfactory. Remember that at a magnification as low as 10 power an error in drawing the chart of 0.005″ only amounts to an error of 0.0005″ at the work.

If your work demands a more accurate chart than you feel can be drawn with a pencil, here's another way to get it. Take your ground glass screen out of the contour projector and spray the ground surface with a fairly light coat of diemakers' blue. If you don't have the spraying kind, brush it on, but keep it fairly light. Then place the screen in the projector and use your height gage as before but with the regular scribing point instead of a pencil. You can then draw lines just as fine as you wish.

You may find that when you turn on the projector light the application of the diemakers' blue to the ground glass has destroyed the diffusion of the ground glass to a point at which the light from the projector lamp is blinding and you will be unable to see fine scribed lines. Here's the remedy. Take a second ground glass screen or any piece of ground glass that will cover your outline and place it against the screen with the ground surface contacting your scribing. This will restore the diffusion and the image of your workpiece as well as the scribed lines will stand out very sharply.

I know that those of you who own a contour projector will think that while this idea of making charts may be all right, a contour projector is an expensive piece of capital equipment to be tied up as a drafting machine, so I'm

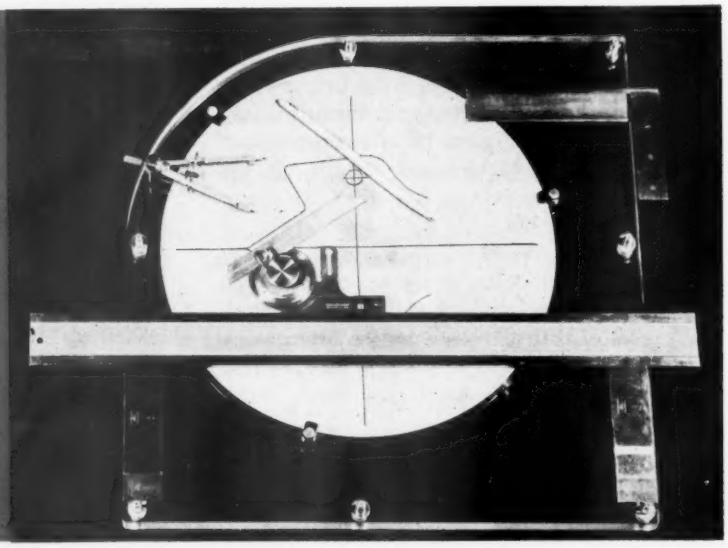


Fig. 13. With this scribing fixture and these readily available tools extremely accurate projector charts can be made using the method evolved by Mr. Jake Phillippsen of Heintz & Phillippsen Tool & Die Company, Rochester, New York. See text for detailed instructions.

going to show you still another way of making charts.

This idea was suggested by Mr. Jake Phillippsen of Heintz & Phillippsen Tool & Die Company in Rochester, New York and I think it is really unique because it utilizes the everyday tools of the shop man to produce superbly accurate charts. Here it is as illustrated in Figure 13.

Take a piece of plexiglass as we did, or if you prefer, a sheet of aluminum and bore a recess in it to accommodate whatever size screen is on your projector; then, sometime when your jig borer is free, bore 4 holes, so that when pins are placed in them a straight edge laid across the pins will pass exactly through the center of the chart. The cross lines of the chart can be drawn exactly at 90° to each other. Actually, as you will see later, these four pins are all that are really necessary. But, if you want to go a step farther, add three pins at the corners. Then, if we lay the straight edge across two of these pins, we can draw a 45° cross line on the chart.

As you can see from the picture, spacing of parallel lines can be accomplished to literally Jo-block accuracy, but for less fancy work, the edges of the plexiglass have been milled square and an ordinary toolmakers' square can be used for laying out parallel or right angled lines. The pins themselves have tapered shanks that fit in tapered bushings so that they can be quickly removed when they interfere with the desired position of the straight edge. The distance between the lower middle pin and the one in the lower right corner is exactly 10″, so that they can be used with a sine bar. The pins on the left edge also can be used for a 10″ sine bar base.

Let's change our tack for a moment and swing back to an inspection problem. Many times a part or tool drawing will be dimensioned as shown for the cam latch of Figure 14.

It is easy to put the 0.125″ dimension on paper, but how is it going to be checked on the part or tool after the corner has been removed by the 0.060″ radius? In other words the problem is to locate a point in space. Let's place the part on a contour projector with the 27° line horizontal. Figure 15 is a drawing of this portion of the latch as it would appear in outline on the screen.

First, align the vertical edge of the part with the vertical cross line. Then, elevate the work table and rotate the screen until the horizontal axis or the axis labeled 2′ is in a position marked 2′ and line up with the lower edge of the part. Now, if the screen can be rotated so that either the vertical cross line or

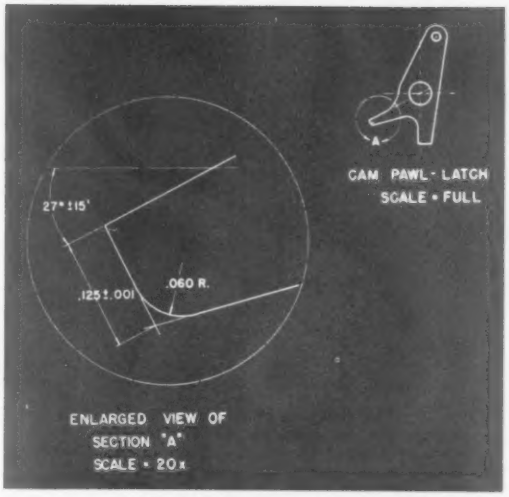


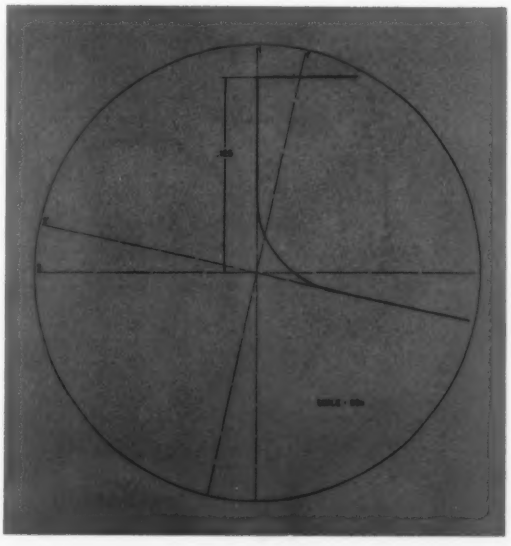
Fig. 14. The 0.125″ dimension is measured from a point in space—not a very easy place to hang a caliper onto! By means of a contour projector, the point in space can be made visible and "tangible" for measuring purposes.

the horizontal cross line will coincide with respective sides of the image, the center of the screen is at the unknown point in space. The projector micrometers can then be set at zero and the 0.125″ dimension checked.

Along with the same problem there is sometimes the need for locating the center of a radius. This is done by use of a screen which has a large number of concentric circles. The profile of the radius on the tool or part is matched to one of the circles and the center of the radius is then at the center of the screen.

I wonder how many of you are aware of this interesting point. Most projectors are equip-

Fig. 15. With the profile of the critical portion of Figure 14 properly oriented on the screen in this manner, the 0.125″ dimension becomes an easy micrometer reading.



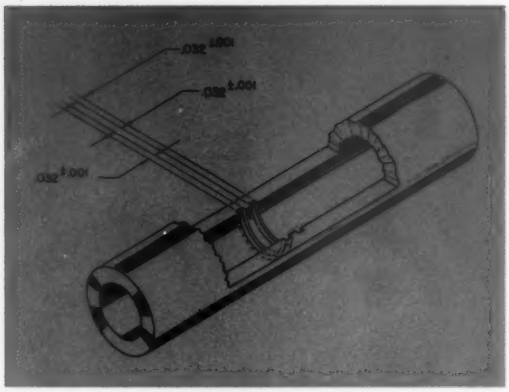


Fig. 16. The checking of internal groove widths and spacings can be done on the contour projector by means of surface illumination plus an assist from a simple, "home made" 90° cone mirror.

ped with micrometer screws for measuring distances very accurately. However, accuracies of 0.001″ and less can be obtained by measuring the image size on the screen using a tool makers' scale and dividing by the magnification. This is the reason that many projectors can be equipped with either a 31.25x lens, or a 62.50x lens. Using a magnification of 31.25x, 1/32″ on the screen equals 0.001″ at the work. Naturally, at 62.50x, 1/16″ measured on the screen equals 0.001″ at the work.

The four basic elements of a contour projector—a light source, an object, a lens and a screen—used to produce the various shadow images that you have seen can be used in another arrangement. Let's imagine for a moment that a young lady is carefully examining herself in a mirror. She's standing by a street lamp which acts as a light source, the mirror as a screen and the very pretty face as the object. In a commercial contour projector, we can achieve the same sort of results by directing a strong light beam through a hole in the lower mirror and causing this light to fall at normal incidence (90°) upon the face of an object, say a razor blade.

The reflected light from the razor blade is then picked up by the lens and projected to the screen using the mirrors to fold the system up into a convenient viewing position. Since surface details are visible, this method is called projection by surface illumination. In actual practice the design of an optical system for surface illumination is more complex than this but this, as least, demonstrates the principle. Actually an astonishing amount of surface detail can be seen by surface illumination.

Now, let's place a hollow cylinder having a port in one side as an object on the work table of a contour projector. Obviously, conventional shadow projection would show nothing. Neither would regular surface illumination, since the curved side of the cylinder would reflect the light away from the lens. But if a mirror is placed inside the cylinder, it will reflect the light back through the port and outline the contour of the port on the screen so that it can be inspected. The so-called mirror need not be glass. Simply polish a flat piece of metal or if that's not convenient wrap a piece of aluminum foil around a flat metal strip. Anything that reflects is all that is needed.

Another useful application of mirrors and surface illumination occurs when it is desirable to examine details on internal bores. A good example of this is illustrated in Figure 16 where the two recesses need to be accurately spaced and of exacting width. Measurement of these by mechanical means would be difficult. If a mirror shaped as a 90° cone is placed in-

. . . *Continued on page 134*

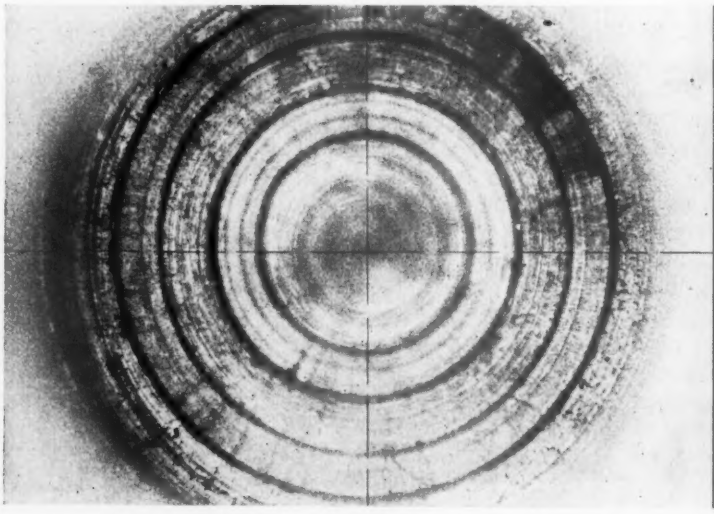


Fig. 17. The grooves of Figure 16 as they appear on the projector screen. The use of the 90° cone mirror causes no distortion of radial proportions, hence direct measurements can be made on the screen of the groove widths and spacing.

Air Power
FOR METALWORKING . . . X

AIR-OPERATED *Toggle Clamps* SOLVE WORK HOLDING PROBLEMS

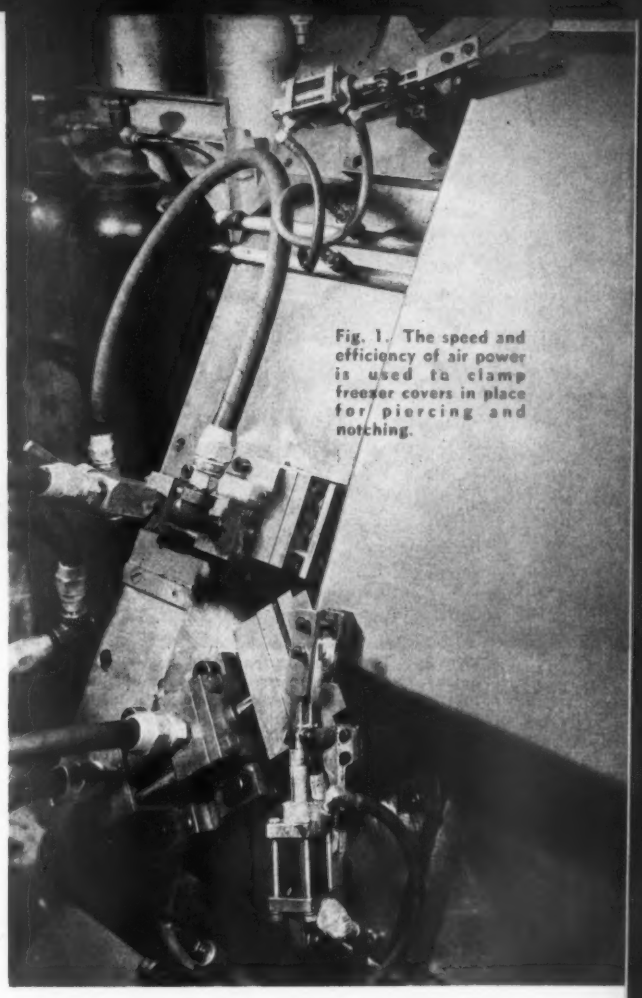


Fig. 1. The speed and efficiency of air power is used to clamp freezer covers in place for piercing and notching.

AN OUTSTANDING DEVELOPMENT of significant importance to the expanding fields of mechanization and automation, has been the introduction of air-operated clamps.

The availability of a standard line of toggle-action clamps designed — by Lapeer Manufacturing Company — to be operated by air, places at the command of every tool designer a means of economically speeding up a great many production operations. The automatic multiple-clamping of large workpieces for secondary or assembly operations in a fully automated setup is now feasible.

The designer has a choice of toggle-bar forces ranging from feather-touch to well over a ton of clamping pressure. Most of these clamps are operated by double-acting cylinders that require air pressure for release as well as for clamping; they will not release clamped work if air pressure should accidentally fail. Clamps operate with a smooth cushioned action.

Just where can these clamps be applied? They are ideal for remote-control clamping where operator time or fatigue would be limiting factors with conventional manual clamping. They permit radical changes in tool design because they eliminate the necessity of placing every clamp within operator reach. They provide sizeable time savings on multiple-clamp installations where all clamps can be operated simultaneously from a single valve, or in planned sequence by use of appropriate time-delay devices or program controller. Where work can be automatically loaded and unloaded, Micro Switches or photo-electric circuits can be used to trigger the clamping action.

The immediate applications, of course, may be of less spectacular nature but nevertheless

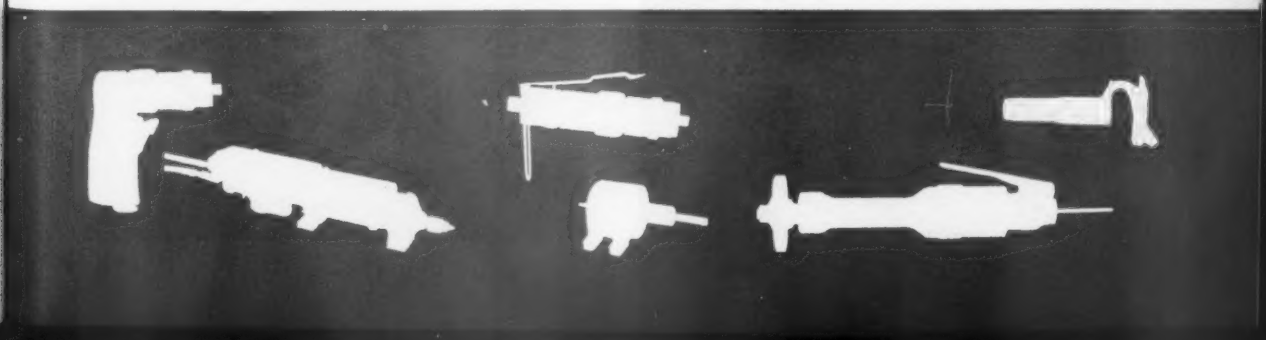


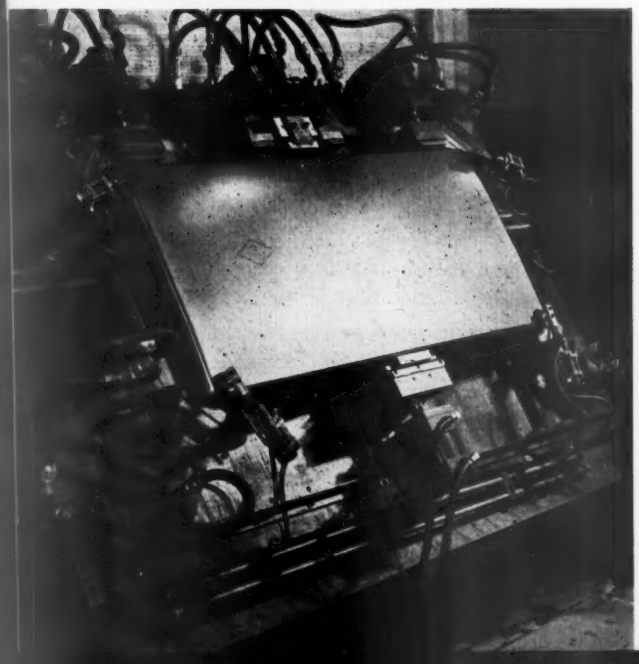
Fig. 2. The pressure pad and arm on the air-operated toggle clamp at each corner of the fixture lifts out of the way to permit free unloading and loading of freezer covers.

will offer extremely worthwhile benefits.

An interesting application of Lapeer air-operated clamps is shown in Figures 1, 2, 3 and 4. The clamps are used on a special hydraulic piercing and notching machine in the Milwaukee plant of Ben-Hur Manufacturing Company. The workpiece in this production setup is a freezer cover, approximately 2½′ x 6-7′.

Figure 2 shows the fixture "open"—before the operation begins. The operator loads the freezer cover over the piercing and notching dies into the fixture; the four AO-200 toggle clamps are automatically actuated, applying

Fig. 3. When the cover has been loaded into the fixture, all air clamps operate simultaneously to hold the work firmly while piercing and notching operations are performed.



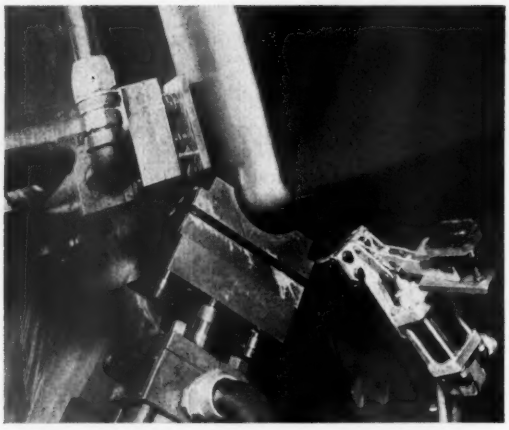


Fig. 4. Close-up of the setup showing typical piercing and notching units and the Lapeer air-operated toggle clamp.

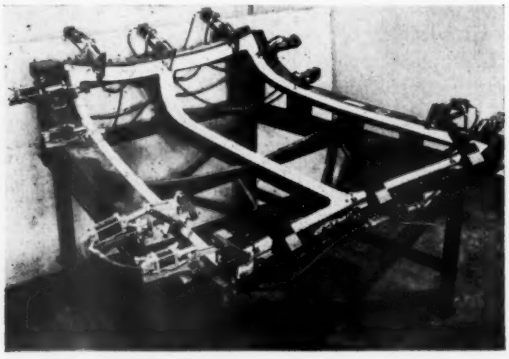
downward pressure at each corner of the freezer cover (Fig. 3). The piercing and notching operation is completed, and the clamps will open up for easy removal of the cover. The sequence is completely automatic.

Figure 1 shows a close-up of one end of the setup, with air clamps providing holding pressure on corners of the cover. Figure 4 shows these clamps in open position, ready for the workpiece to be unloaded.

For applications where conventional clamping would result in interference with the cylinder, a Lapeer double-toggle action clamp designed for vertical mounting can be used.

A rapidly developing application for air clamps is the holding of work in plastic fixtures. The economies inherent in simplified, lightweight plastic tooling are increased by the speedy, safe action of air clamps. The welding fixture shown in Figure 5 was built by Ren-ite Plastics, Inc. for a hood assembly operation. This is typical of the fixtures that can be quickly fabricated from conventional cast iron or steel framing and suitably faced with reinforced plastic.

Fig. 5. Added to the light weight and low cost of this Ren-ite plastic-faced welding fixture, is the speed and positive clamping action of air-operated toggle clamps.



Air Power FOR METALWORKING . . . XI

The Application Engineering OF PORTABLE TOOLS

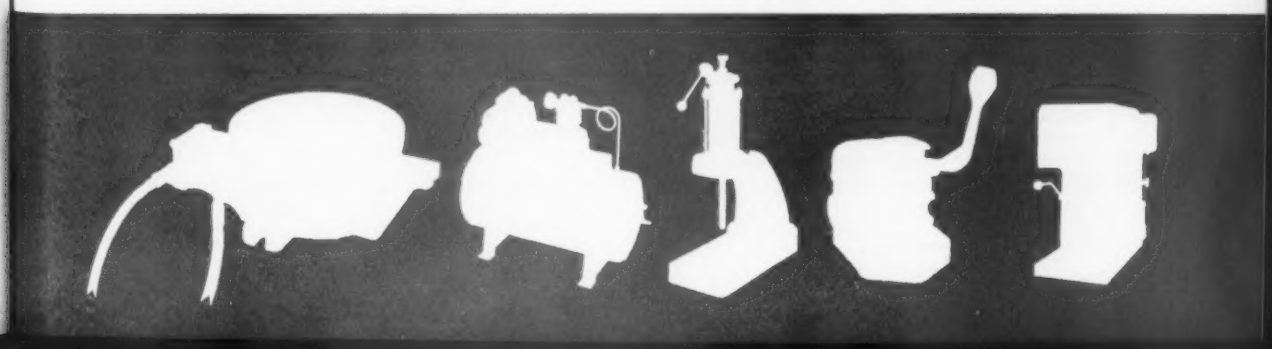
by Floyd Paschke
Application Engineer
ROTOR TOOL COMPANY
Cleveland, Ohio

AIR OPERATED PORTABLE TOOLS are designed to take the tool to the work, performing the operations quickly and satisfactorily and thus paying for themselves rapidly under today's high operating costs. With labor and overhead running usually a minimum of $4.00 an hour, savings of $75.00 to $200.00 are required to pay for the individual tools. Such savings are often realized within a period of two to ten weeks even though the computation faces the fact that the percentage of actual time spent in the operation of the tool may be only 20% or 30% of the man's time.

The problem of the factory executive in analyzing his portable tool operations starts with the realization that each man using portable tools costs 2000 hours per year times $4.00 an hour or $8,000.00 a year. The efficiency of output of the individual is directly dependent upon the efficiency of the output of the portable tool he operates, so that relatively small savings such as say 10% would justify careful analysis. The specific problem is how to find the places for savings, how to analyze the situation to find the answer, and how to prove to the Management that the expense is justified.

Here we meet the basic difficulty that an application engineer (or project engineer or analyst) encounters. He can hardly approach a complex application problem without first knowing what is available in the way of portable tools and portable tool accessories, of which there are literally thousands. There are hundreds of different types of portable tools. These, in turn, may often be modified as regards speeds, front handles, rear handles, power, etc.

The purpose of this article is to suggest only the broad approach the application engineer may make to his problems and this approach will vary somewhat with the different types of tools listed. No attempt will be made to cover the entire scope of the situation which, of course, varies widely with the individual factory, but rather to suggest a logical, practical approach based on actual experience in this field. In some cases the approach is an obvious short cut one, solving a problem previously found in similar situations. In other cases, a step-by-step analysis is necessary, being certain that the facts involved at each step are true and arriving at a satisfactory solution only by patience and sometimes long study.



Example of Step-by-Step Approach

Let's turn first to a good example of the step-by-step approach which is often found in the small wheel grinding field. This type of tool, Figure 1, is used with a great variety of cutting accessories and the tool itself is available through tool manufacturers in speeds ranging from 8,000 to 40,000 rpm. They come with a wide range of power and with almost endless varieties of front and rear ends to fit various clearances. The accessories are available in part only through the tool manufacturers and in many cases through other manufacturers, so that the approach must be a thorough one to determine in the first step what cutting accessories may be applied to the specific job.

We have found in many cases that the help of an alert purchasing agent in gathering this information will save the time of factory executives and thereby furnish them with adequate basic information.

Should the accessory selected be a grinding point, a small wheel, a carbide bit, or cone wheel?

Let's take a simple example of the step-by-step approach. The problem was to grind welds smooth on high pressure ½" diameter tubing for condensers. The tubes were jammed together in the condenser and there was very little clearance. Under the existing setup, 15 min. grinding time was required per weld.

The first step was to determine the correct cutting accessory that would reach in and do the job fast. This proved to be a mounted point ⅜" in dia., ½" long, with a ⅛" shank. The logical way to hold the cutting accessory was a collet and bushing. The proper speed for this small point — the highest possible speed — will, of course, give the most cutting action. However, in the case of mounted points reference must always be made to the American Standard Safety Code B7.1-1947; the application engineer finds that for this wheel he must determine accurately the amount of overhang between the end of the collet and the back surface of the point — which proved to be 1". Maximum speed allowable was 85% of 28,000 or 23,800 rpm.

At this point it developed that a 1" overhang was not necessary and might cause a whipping action. A change was made to a slightly shorter mounted point with ½" overhang which gave a safe operating speed of 38,250 rpm. A check was then made of clearances on the front end of various small wheel grinders, resulting in a type No. 4, 13-oz tool, 5¾" long being specified. In this case there was no option as to the type of throttle, but the sliding sleeve throttle appeared to be satisfactory. A check was made of the construction of the tool to be sure that the spindle was one piece, that a collet guard was furnished, and the bearing construction satisfactory.

The tool when tried on the job reduced the grinding time from 15 to 8 minutes or 46.5%.

Seven Basic Types or Classes of Portable Tools

1. ***Drills.*** **Suitable with various modifications, speeds, types, etc. for drilling, assembling, reaming, tapping, tube rolling, countersinking, filing, and other operations.**
2. ***Screwdrivers and Nutsetters.*** **Used with various clutches, various front ends, different powers, etc. for screwdriving from No. 2 to No. 12 for nuts from ¼" up as high as 2".**
3. ***Percussion Tools,*** **giving reciprocating motion such as scalers, chipping hammers, sand rammers, riveting hammers.**
4. ***Small Wheel Grinders,*** **which may be defined as carrying a wide variety of attachments ranging up to 3" diameter grinding wheels. Typical applications are die grinding, smoothing recesses in castings, finishing surfaces or welds, etc. — 1001 jobs. These tools weigh from 12 oz to 4½ lbs.**
5. ***4, 6 and 8" Grinders,*** **carrying standard wheels, usually the high speed type and including a variety of cone wheels, and including some semi-standard modifications for specific applications such as 13" or 26" extensions, right angles, etc. The field of application is very wide in grinding, including cleaning castings of all types and removing defects from steel bars, cleaning of welds, etc. The same basic tools are used with some modifications for additional operations like buffing, wire brushing, etc.**
6. ***Vertical Grinders,*** **similar in use to type No. 5 but carrying the cutting accessory in a position vertical to the work. Used with various types of cup wheels, edge wheels, also wire brushes, 5, 7 or 9" sanding pads. The major difference between Type No. 5 and Type No. 6 lies in the ease of handling of this type of tool on many classes of work and the ability to approach closely a flat finished surface.**
7. ***Specialty Tools.*** **A miscellaneous group usually designed for a specific large volume operation and later modified or applied to similar operations throughout the metalworking field. Examples include clip squeezers, furniture squeezers, hog ringers, tools for setting patented locking devices, ratchet wrenches, stationary air motors, etc. Increasing emphasis of competition on costs will undoubtedly extend this portion of the portable tool field.**

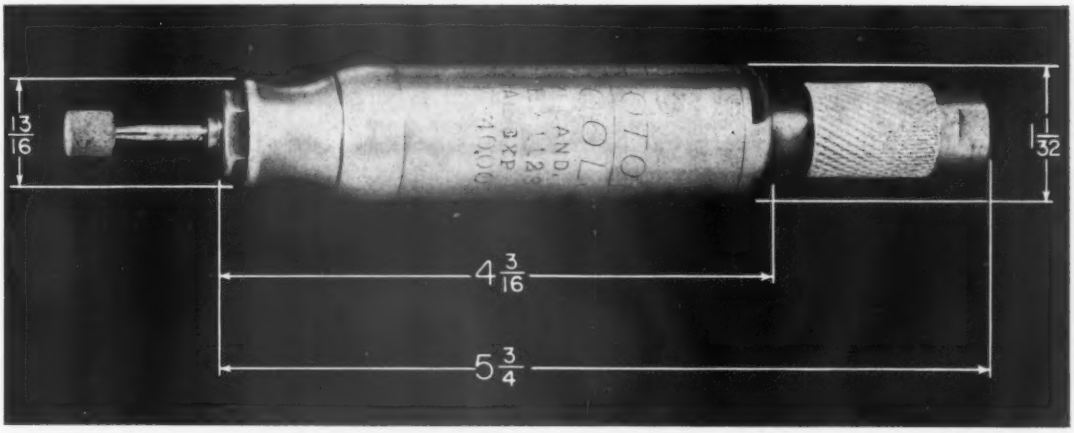


Fig. 1. This small type of tool operates at speeds ranging from 8000 to 40,000 rpm. It is used with a great variety of cutting accessories and is particularly useful in reaching difficult locations.

The "payoff", Figure 2, amounted to $22.32 per week which paid for the grinder in 3½ weeks operation. Later checks developed that the mounted points operating at this speed lasted twice as long thus adding more to the savings.

Note that particular attention was given to the "factor of use" in figuring the saving, which in this case was 60%. This figure, therefore, was a sound estimate which would be accepted by executives. Proof is always necessary and is conveniently given in the form of a "time to repay" statement as shown in the Figure 2. Later when the tool is installed proper attention, of course, must be given to the follow through, providing proper lubrication, proper maintenance, proper hose, etc. Once a tool is installed and has paid for itself, the savings continue. As a matter of fact, in this case eight tools were involved, multiplying the total savings resulting from the application engineer's original analysis.

Drills

Here the application engineer finds relatively simple situations which revolve around the size and type of drill which, in turn, determines the speed under load. Secondary check-up on the power to drive the drill including breaking through, is in order. The application of portable drills is not profitable in general if the work can be done while the piece is already in a machine tool, but in many assembly operations much time is saved by bringing the tool to the work. A recent trend in this field is the use of the air-operated, air-feed drills which may be installed, in spite of somewhat high initial expense, to drill certain holes while the piece is mounted on some large machine tool thereby avoiding material handling costs.

Screwdriving and Nutsetting

Briefly, the application engineer starts with the screw to be driven, deciding on the type of

THE "TIME TO REPAY" MAY BE SHORTER THAN YOU THINK. HERE'S HOW TO FIGURE IT...

PRESENT TOOL Air Die Grinder TIME REQUIRED PER UNIT 15 MINUTES

ROTOR TOOL Air Pencil Lyre TIME REQUIRED PER UNIT 8 MINUTES

SAVINGS 7 MINUTES

DIVIDE SAVINGS BY PRESENT TIME = 46.5 % SAVING

HOW MUCH OF TIME IS TOOL USED? 50 % USE

HOW LONG WILL IT TAKE TO PAY FOR THE NEW TOOL?

PRICE OF NEW ROTOR TOOL $ 75.00 = $ 75.00

46.5 % SAVING x 60 % USE x $ 2.00 HOURLY RATE x 40 HRS. PER WEEK $ 22.32

3-1/2 WEEKS TO REPAY THE COST OF NEW ROTOR TOOL

SURVEY MADE FOR

By ROTOR TOOL COMPANY CLEVELAND 23, OHIO

Fig. 2. The "Time To Repay" card demonstrates the result of an application engineer's survey. It shows the savings per week and the number of weeks to pay for the replacement tool recommended.

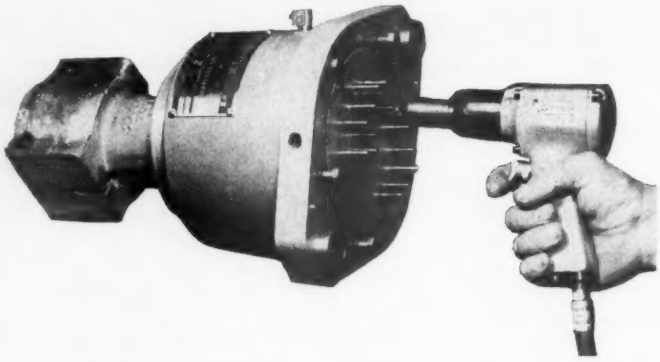


Fig. 3. This nutsetter replaced a hand operation of running down 6 hex cap screws and reduced the time from 2 to ½ min. The savings paid for the tool in 8.7 weeks.

bit, finder or socket, and at this point a broad approach may be helpful. The design may specify a typical flat head screw but the application engineer may anticipate the bit slipping off the screw and marring the work and therefore, in turn, suggest to the design department a change, let's say, to a Phillips head screw.

Next, in this rather logical process comes consideration of the type of clutch. Direct drive, often with a dog clutch which goes into operation when the tool is pushed on the work, gives uniform tightness but may not be powerful enough for strictly hand operation. Positive clutches, with dog clutches giving hammer-like action, are particularly good for self-tapping screws but, of course, sometimes jar the operator. Double adjustable clutches provide a smooth action at somewhat higher expense and can be adjusted to give uniform tension.

In all cases, the rpm must be considered in order to speed up the operations as high as possible. Reversible tools are usually specified at small extra cost so that screws occasionally driven in at an angle can be backed out. The size of the tool is important too. Sufficient power must be provided to do the job day after day but operators always prefer the smallest tool possible. Finally, clearance to get at the job must be checked by the application engineer, and this in turn, may shift the specification from a straight tool to a right angle or 45° angle tool.

The same general logical approach is suggested for nutsetting in small sizes; but, where nuts of ⅜″ or larger are in use, the impact wrench type of tool is usually faster than the clutch type. The uniformity of tension is obviously not so certain with the impact wrench but, in practice, operators become successful in controlling this to a reasonable extent. Probably no type of portable tool has enjoyed a faster application in recent years than the impact wrench which is now made in a wide range of sizes.

A simple case history will indicate the general scope of savings with impact wrenches. Here the job was to set 5/16″ hex screws in gearless drill heads, Figure 3, with the tool used 25% of productive time. The former hand method required 2 min. to run the screws down, but the wrench often scored the finished surface. Use of a ¼″ impact wrench cut the time to ½ min. — four times as fast. The savings paid for the new Rotor wrenches in 8.7 weeks and eliminated scoring of the surface. The "time to repay" in the case of impact wrenches is often almost unbelievably short.

For high production jobs, multiple nutsetters may well be considered by the application engineer. Two, three or maybe six nuts may be set at one time by a corresponding number of tools, usually torque type held in a special fixture and operating simultaneously. Multiple tools are naturally expensive but where production is high as in the automotive industry, recent developments indicate further extension in this field.

4, 6 and 8″ and Cone Grinders

The study of cutting accessories in this field takes two basic approaches. First, the size and shape of wheel is studied which will prove the best for the work. The work usually varies widely and since a great variety of wheels are available — ranging all the way from cone wheels to 4, 6 and 8″ wheels — a thorough study is in order. The second step is — What wheels will give the best combination for metal removal and wheel life? This usually calls for outside help from a sales engineer of the grinding wheel companies, so that both questions

may be studied at the same time.

A word of caution, however, against several pitfalls is in order. The entire extent of the work to be done will hardly be studied by the outside sales engineer and it is necessary, of course, to be sure that the size of wheels selected will do all of the work. Moreover, the visual indication of metal removal, such as sparks from different wheels, is usually an inadequate indication of both the metal removal and the wheel life. It is easy to suggest a wheel which throws a lot of sparks, but that wheel may involve excessively high wheel costs. The consideration of this possibility has become more important in recent years with the advances in the price of grinding wheels, particularly in the smaller sizes.

The only way to do a thorough job on the part of the application engineer is to make some actual metal removal tests. Test samples of the metal are weighed, ground three or four times to average up, then weighed again. The wheel loss, also, is determined by weighing the wheel before and after the tests. Care must be taken to be sure that the wheels do not load up between the different tests, and it must be admitted that as these tests are usually performed, they are not entirely scientific. On the other hand, from a practical point of view they will indicate wide variations.

Another point which simply **must** be checked in making preliminary tests is the air pressure delivered to the tools while they are in actual load contact. While this is a bit aside from the basic approach of the application engineer, experience shows that air pressure (indicated by an air gauge with hypodermic needle pushed into hose), while the tool is running, is often as low as 50 or even 40 lbs. for a tool designed to perform properly at 85 or 90 lbs. Under such conditions the tests are certainly not fair because not enough power is developed to get all the work available out of the grinding wheels. In any event, the first major improvement to be made by the application engineer in the entire situation may be to correct the air pressure delivered to the tool and raise the efficiency of the present operation 25 or 33% by this simple step.

It is not unusual to find cone wheels operating on 6,000-rpm grinders, mostly because such grinders are available. In one case, cone wheels

Fig. 4. Short spindle, cone, 17,000 rpm grinder weighing 4 lbs.-10 oz replaced a 6,000 rpm grinder weighing 12 to 13 lbs on this casting clean-up job. Grinding time was reduced 33%, wheel cost cut 50%, and operator fatigue reduced. The savings paid for the tool in 8½ weeks.

1¾" x 2¾" x ½" were used on 6,000-rpm grinders weighing 12 to 13 lbs. The tool was hard to control on small contours. A change to a small wheel, short end spindle die grinder, Figure 4, running at 17,000 rpm, reduced the tool weight to 4 lbs., 10 oz. This tool permitted faster, easier handling. Grinding time was cut 33%, wheel cost was cut 50%, and operator fatigue reduced. "Time to Repay"—8½ weeks.

The matter of wheel life is very important and tests under low pressures will probably lead the application engineer astray on this point.

Many shop jobs are just plain tough to handle. In one case the edges of flame cut hanger plates, made of an alloy steel, had burned surfaces and had to be smoothed. The existing method in use covered 4500-rpm grinders chosen to give sufficient power with the resulting output of 50 pieces per day. Here a No. 4, 8500-rpm grinder was tested using a 4 x 2 plug wheel. The power available in this type of tool today is way beyond that available a few years ago and proved to be adequate to pull the wheel and keep it up to speed. The result was an output of 72 pieces a day or 44% more output. This changeover paid off the cost of the new tool in one month. After that, the savings were pure profit.

The use of cone wheels must not be overlooked in this analysis. These are available in a far wider variety than shown in the simple chart. Cone wheels get into corners and recesses and give a good finish — an important item which oftentimes cannot be exactly evaluated in dollars and cents. Cone wheels, however, must be driven at the right speed—usually a higher speed than used on the straight side wheels so that many plants as a matter of course provide a machine for each of various size cone wheels. For example, where a 6" grinder with straight side wheel is necessary to start a job, the addition of a 2¾" cone driven at 9000 rpm in a separate machine permits the operator to complete the job at optimum speed — with resultant high saving.

Vertical Grinders

In the general analysis of grinding problems, the application engineer goes from consideration of straight side and cone wheels as discussed above into consideration of the vertical type of wheels. It may well be necessary for him to evaluate in a rough way the exact value or importance of the flat surface produced by these wheels, irrespective of the metal removal, although metal removal by the vertical type wheels is usually quite high because of the wide area of contact, providing ample power is delivered to drive the wheel.

Here is an example of project engineering analysis in the sanding field. Large truck cabs had to have heavy welds blended for good appearance and the men objected to operating 14-lb grinders, particularly because the shop was on incentive. A 10-lb vertical grinder operating at 6000 rpm was tried, using 60-grit discs. Time study showed increase of 25% in production. The savings paid off the new tools in 13 weeks, reduced operator fatigue, and cut maintenance and sanding disc costs. The latter item has become more important as a result of increases in the cost of the discs themselves. This saving in weight is important where machines are used "up in the air."

For overhead work or sanding with a lighter weight tool, a 7-lb vertical machine may be indicated. These machines are designed to operate 4" and 6" cup wheels or 5" or 7" sanding pads.

The use of the thin edge wheels should be studied in many cases and in this case particular attention should be paid to the guards and the safety factor. The cutting action of these wheels in many situations is remarkable.

In the fields for type No. 5 and No. 6 tools, the problem of weight always arises. Today's operators do not want to handle tools equipped with wheels and guards, which weigh 15 to 18 lbs. Maybe the operators are lazy but the application engineer often finds that he will get more tonnage, which after all is his goal, with say 4" wheels instead of 6" wheels or with 7-lb small verticals instead of 13-lb large verticals. Actually, due to the development of more efficient air tools in recent years, many of these lighter machines will give very fast metal removal, but with one provision, namely, the proper air pressure, that is, if 80 lbs is delivered to the tool while under load.

Specialty Tools

The application engineer will encounter situations where a special purpose tool will solve his problem, or he has the alternative of having a special tool developed. Many special purpose tools have been developed for performing hard-to-do jobs with time saving features.

The variety of these tools is so great that the subject merits special treatment in a separate article which will be published in a later issue of TOOLING & PRODUCTION.

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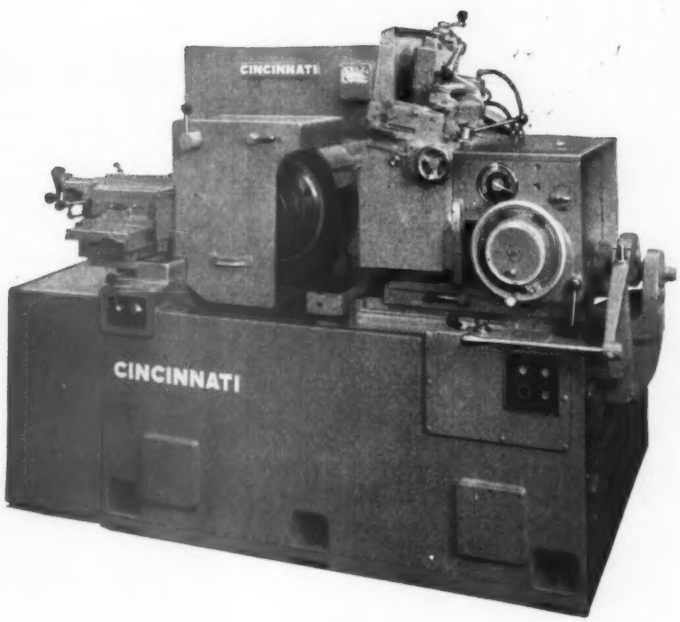

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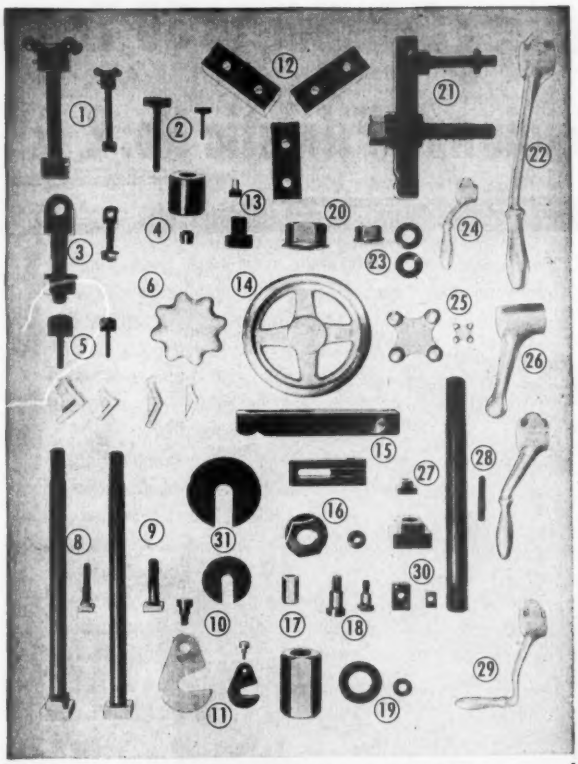

OVER 500 JERGENS STANDARDS SAVE TIME--LABOR--⅔rds THE COST

Illustrated above are just a few of the more than 500 Jergens Standard Jig & Fixture Components. One of the most complete lines in production today, mass-produced Jergens Standards save you the skilled tool and die room help necessary for the custom making of component parts in your own shop. Keyed to the photograph and listed below is a brief description of a number of these items now immediately available from stock. Write for descriptive catalog and price list.

1. Clamp Shoe Assemblies—14 sizes—alloy steel screws—hardened steel shoes with snap ring lock.
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4. Jig Rest Buttons—4 sizes—hardened—ground.
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6. Palm Grip Hand Knobs—with reamed, tapped, or square hole.
8. Tee Slot Bolts—standard sizes ⅜" to 1" —various lengths.
9. Tee Bolts—standard sizes ½" to ¾"—various lengths.
10. Shoulder Screws—for use with swing "C" washer.
11. Swing "C" Washers—4 sizes—comes with shoulder screw.
12. Blank Soft Chuck Jaws—19 standard sizes—S.A.E. 1020 Steel—in stock to fit approximately 273 master chucks at a moment's notice—special blanks made on request.
13. Rest Buttons—4 sizes—hardened—ground.
14. Hand Wheels—4 sizes 6" to 12" in diameter—aluminum alloy.
15. Strap Clamps—hard and soft—plain or with radius.
16. Flange Nuts—9 sizes—hardened.
17. Extension Nut Couplers—8 sizes—alloy steel.
18. Shoulder Screws—24 sizes—Hex head socket—160,000 to 180,000 P.S.I.
19. Plain Flat Washers—8 sizes—hardened—ground.
20. Spherical Flange Nuts—9 sizes—hardened—ground.
21. Strap Clamp Assemblies—comes with spherical flanged nut assembly or hand knob for clamping the strap.
22. & 24. Offset Handles—aluminum alloy or malleable casting.
23. Spherical Washers—hardened—ground.
25. Hand Knobs—aluminum alloy casting.
26. Clamping Levers—aluminum alloy or malleable casting.
27. Tee Nuts—14 sizes—hardened.
28. Studs—stress-proof steel.
29. Crank Handles—aluminum alloy or malleable casting.
30. Fixture Keys—(hard or soft)—ground.
31. "C" Washers—22 sizes—4, 5, and 6 diameters each size—ground.

Jergens BETTER TOOLS AT LOWER COST
TOOL SPECIALTY CO.
712 E. 163rd ST., CLEVELAND 10, OHIO

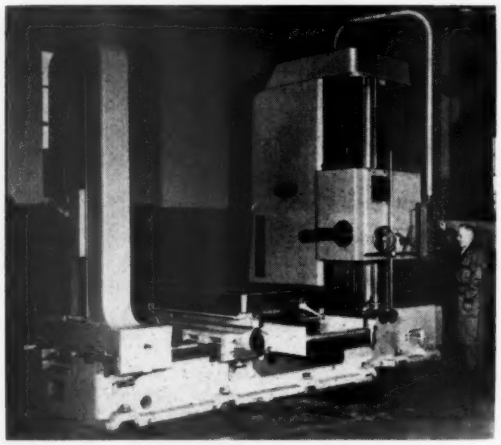
CIRCLE INFORM-A-GRAM KEY NO. 781

NEW BULLARDS OFFER OUTSTANDING DESIGN AND PERFORMANCE

The Bullard Company has come up with a completely new design of table type horizontal boring, milling and drilling machines. The entire Model 75 line, comprising machines of 3", 4" and 5" spindle diameters, incorporates outstanding design and performance features heretofore unavailable in this type of equipment.

Simplified controls and ease of operation plus a rugged over-all design and construction, spell operator convenience, increased productivity, sustained accuracy and long life.

For the operator, all functional controls of the machine i.e., directional feed and traverse control of the spindle, head, table and saddle, selection of feed and speed rates, spindle direction of rotation, and head binders, are grouped



at a movable pendant station. A unique feature of this pendant, which can be swung to any vantage point, is that the operator employs direction-indicating levers for any required feed and traverse motion instead of conventional push buttons.

Another development is both a screw and a rack feed for the spindle. This makes possible a smooth, steady power feed for boring as well as a sensitive hand feed action for small drilling and tapping. A selector switch on the front of the head gives either type of feed.

The weight and proportions of the new head post and head are considerably greater than the previous model. The head post is a massive, full height box section, providing greater rigidity for the head when at its highest operating position. The result is less head deflection and greater ability to absorb the shock of heavy cuts and feeds without sacrificing accuracy.

An optical measuring device is provided for the head and table. This visual measuring system enables the operator to quickly and ac-

. . . *Continued on page 82*

The most revolutionary achievement in arc welding equipment in years!

Patent Pending

Dimensions: only 11" x 12" x 7½"

BREN WELD MODEL 200 AW

FIRST TRULY PORTABLE 200 AMP. OUTPUT ARC WELDER

Weighs only 65 lbs . . . Carry it to the job!

OBSOLETES ALL OTHER WELDERS OF COMPARABLE RATING

Sensational new transformer development produces far more power to pound! The BREN/WELD does work of conventional welders 4 or 5 times its size and weight . . . Actually delivers up to 250 amps at reduced duty cycle.

Simple to use, fully guaranteed, it operates on 110/220 volts AC, 50/60 cycles; handles electrodes from 3/64" to 5/32". Has adjustable arc voltage for different arc characteristics. Ideal for plant production and maintenance, for construction work, railroads, on farm or home.

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24 HOUR DELIVERY FROM STOCK!

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And, proportionately low prices apply to to your problems. This is actual proof that you can save money on short run stampings.

Send today for a FREE sample part, with a cost summary, and our bulletin which illustrates 40 small stampings. Send in your blueprints to our engineering department, also, for a prompt quotation.

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FAST DELIVERY

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TEST HARDNESS OF ANY SIZE, SHAPE, TYPE METAL . . .

anywhere . . . in one easy motion!

This 30 oz., 3 in. high tester, in 30 seconds, gives direct dial readings on the job. Just press handgrips, read dial.

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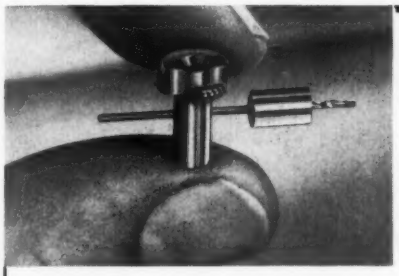

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No change in price or delivery for metric and special hole sizes in STANDARD MICRO DRILL GUIDE RANGE OF #80 to 3/32" in listed body sizes.

PLUS . . .

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Commonly recurring sizes are stocked finished. Also complete stock of 75 semi-finished standard body styles and sizes—ready for completion.

Orders marked "Special Rush" receive priority handling.

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No counter bore . . . diamond lapped hole with full length drill bearing.

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Special Micro Drill Guides with body sizes other than those listed and hole sizes not in the standard #80 to 3/32" range.

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Engineered MICRO-TOOLING, drills, jigs, collets, etc.

MICRO DRILL GUIDE

JEDCO

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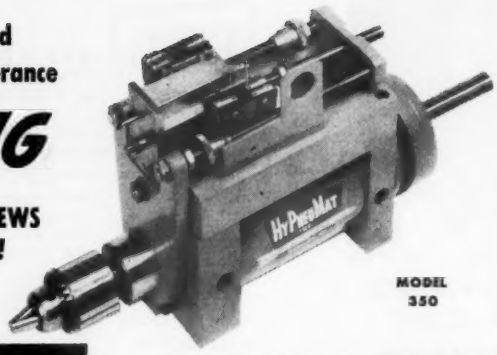
NOW High Speed Close Tolerance

TAPPING

WITHOUT LEAD SCREWS OR TAPPING HEAD!!



MODEL 350

HYPNEUMAT
AUTOMATIC DRILLING AND TAPPING UNITS!

HYPNEUMAT Units, precision made with almost zero reciprocating friction, permit a floating cushion action to the spindle, allowing the tap to automatically feed itself, subject to no force other than the torque. With the elimination of all axial friction, the tap may be rotated at high speeds, usually the same speed the hole is drilled, and with the assurance that every thread is perfectly produced.

CAPACITY: 3½" STROKE
⅜" Drilling in Steel — ⅜" Tapping

- SEALED UNIT Construction permits mounting in any position with pulley or direct motor drive.
- AIR or HYDRAULIC Control of speedy approach, stroke and rapid return.
- ENCLOSED ELECTRICAL SWITCH for remote electrical operation.
- QUILL CLAMP EXTENSION permits extremely close radial grouping.
- EASILY INTERLOCKED with indexing tables, automatic work feeders and fixtures.
- HYDRA-BRAKE prevents drill dive at break through point.

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FREE Send for our free catalog containing detailed information of HYPNEUMAT Automatic Drilling and Tapping Units and their adaption to modern high speed production equipment.

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Ductility Testing
quick & easy

The turning of a single hydraulic control knob clamps the specimen, tests it, then releases it The test is made in plain view, and the maximum pressure indicators show the result until reset. This highly sensitive sheet metal tester will take up to ⅜" thick specimens and exert up to 30,000 pounds pressure, at any desired rate of speed. Hydraulic mechanism is all neatly enclosed. Write for catalog sheet and prices.

DETROIT TESTING MACHINE COMPANY

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CIRCLE INFORM-A-GRAM KEY NO. 802

BULLARD VERTICAL 75'S EMBODY NEW DESIGN

Pictured here is the new 26" "Cut Master" vertical turret lathe, a member of the latest designs from the engineering boards of Bullard Company, originators in 1901 of the side-head vertical turret lathe The 26" machine is the smallest of six sizes (26-36-46-56-66 and 76" tables) with a variety of head combinations and is representative of a completely redesigned version of this type of machine tool. Appropriate to the company's 75th anniversary (1955), the new machines will be designated the Cut Master Model 75.

A feature of the newly designed line is the unique hydraulic shifter unit which makes it possible to control all functions of the machine from a single, movable pendant station. The design of the pendant is unusual in that it incorporates the use of directional lever action instead of push buttons for ease

. . . *Continued on page 84*

Fast, Safe Way To Clean Tools, Dies and Small Parts

FOUNTAIN BRUSH ACTION and CLEAN FILTERED SOLVENT

FOR THE TOOL ROOM MAINTENANCE & PRODUCTION

Grease and dirt flows away as operator brushes and clear solvent flows through brush bristles. No splashing. Fits on work bench or portable stand, 20" square. Has separate dip tank at rear.

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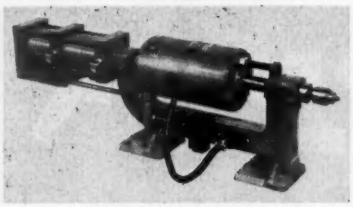
CIRCLE INFORM-A-GRAM KEY NO. 811

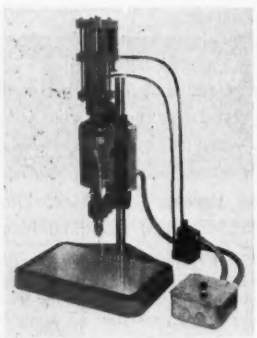
Announcing NEW IMPROVED



IN-LINE AUTOMATIC DRILL UNIT

by Electro-Mechano Company

Model 111 Base Mounting



Model 110 with Valve and Relay

In 1947, E-M introduced its first semi-automatic production drill unit. Thousands have successfully been used to solve simple and complex drilling jobs, etc. Now E-M proudly presents a New Line of compact self-contained air feed variable spindle speed drill heads featuring: IN-LINE design of pneumatic feed, hydraulic control, electric motor and spindle. All side pull on spindle has been eliminated. Air and oil are separate; oil sealed in closed circuit. Push-Button or automatic electric control—Rapid advance to work—Adjustable feed thru work—Automatic return and cycling.

CAPACITY .004"—.156"

STROKE 1½"

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PRICES—Ready to Drill:

COLUMN MOUNT $292.50, PAD MOUNT $310.00, VALVE-RELAY $38.00

Write for Literature and Name of Nearest Dealer

The ELECTRO-MECHANO Co.

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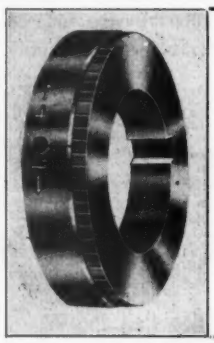

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SAVE TIME

ON GANG MILLING SET-UPS

These MICROMETER ADJUSTABLE SPACING COLLARS are designed for accurate spacing of side milling cutters, gang milling and various other multiple setups on milling machines. Accurate spacing of the milling cutters is easily made by merely loosening the cutter arbor nut and making a plus or minus adjustment.

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For immediate delivery specify size and mail orders to . . . . . .

Size of Cutter Arbor	Maximum Outside Diameter	Price
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1	1-13/16	11.50
1¼	2-1/16	12.25
1½	2-7/16	12.25
1¾	2-3/4	14.50
2	3-1/16	16.50

DAYTON ROGERS

Manufacturing Company

MINNEAPOLIS 7 B, MINN.

CIRCLE INFORM-A-GRAM KEY NO. 822

. . . New Bullards, from page 78

curately set the head or table to any desired position.

Many other standard features include feeds in inches per revolution and inches per minute for all motions, automatic depth knockout for spindle, hydraulic counterbalance for head, and a massive rear post for supporting extension boring bars. Accessories such as continuous feed facing heads, right angle milling attachments, thread cutting attachment, coolant system and boring bars of all types are available as extra equipment.

Complete illustrated literature and detailed specifications may be had from The Bullard Company, Bridgeport, Conn.

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Precision PLUS!!

INTERNAL GROOVE GAGES

Greater Accuracy

Faster Operation • Easier Reading

for THREAD RELIEFS • "O" RING GROOVES • SNAP RING GROOVES

Positive Accuracy assured with readings to less than ± .0001 — Faster, easier readings with large 2" Indicator Dial. Ranges from .300" to 6.000" — Inreach to 30". Simple setting with outside micrometer or gage blocks. Lightweight. WRITE TODAY!!

RIMAT TOOL COMPANY

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Air and Hydraulic Cylinders • Presses • Air Control Valves

CIRCLE INFORM-A-GRAM KEY NO. 824

ANOTHER CARBIDE PRODUCER TO APPEAR

The formation of still another company to produce cemented carbide is expected to be formally announced in the next few weeks. Carrying the brand name of Valenite, the ultra-hard metal will first be offered in grades for cutting tool applications. Die and wear-application grades will probably follow soon after.

The company set up to produce the Valenite metals is now installing modern equipment in its new plant north of Detroit. The company was formed by a group of young, capable, and aggressive tool men well experienced in the manufacture of carbide cutting tools. Key personnel includes men who pioneered major carbide advancements.

These men are starting off with vacuum sintering equipment and methods developed out of years experience with this process. They point out what they feel are mistakes being made by others in the use of vacuum, and what they are doing to avoid such errors in making Valenite. In the eyes of this editor, they seem to know what it takes for a good carbide.

— W. N. Nordquist

EACH STROKE = 1½¢ MORE PROFIT

In three seconds flat, a Wilt-O-Matic Power Vise will clamp work that would require 30 seconds to position and secure in an ordinary vise. On repeat operations, like grinding or finishing, Wilt-O-Matic's fast, strong, air powered hydraulic clamping means more production, less labor per piece, less worker fatigue, on all bench operations.

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For milling, slitting and gang-saw setups, shimming gears and bearings. Sets in 20 diameters ⅜" to 4" . . . 19 graduated thicknesses .001" to .125", specials over .125". Spacers with keyways, shims without. Stocked by Industrial Distributors.

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50 times FASTER than HAND

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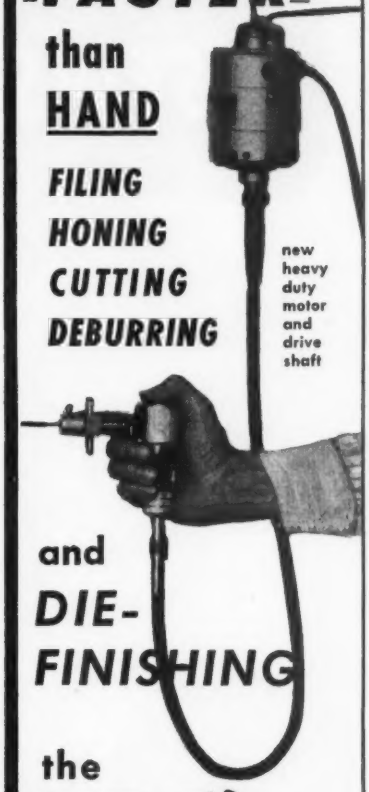
new heavy duty motor and drive shaft



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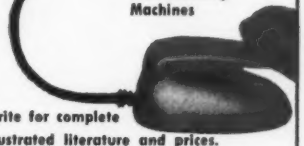
the Di-Profiler TRADEMARK

This is the ORIGINAL "improved" motor driven die filing and cutting tool that speeds up the tool makers' fine work. It takes the hard work out of die-finishing providing from 0 to 15,000 reciprocating strokes per minute with foot control.

Tests have proven that this precision tool speeds up die work by as much as 50 to 100 times. Even sharpens carbide dies.

DISTRIBUTED By the makers of Nibblex and Nordex Metal Cutting Machines



Write for complete illustrated literature and prices. Our representative will demonstrate.

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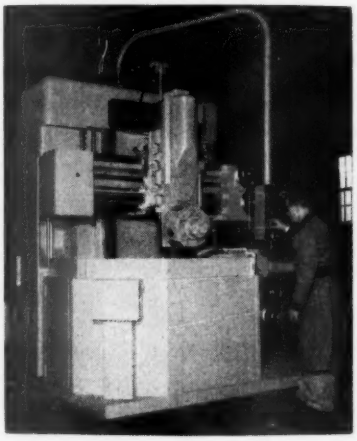
CIRCLE INFORM-A-GRAM KEY NO. 841

. . . Bullard Vertical, from page 80

of operation and operator safety. For example, if a feed or traverse lever is engaged to the left, the motion of the head is to the left. The full range of 20 table speeds and 16 feeds is quickly obtainable through the use of dials on the side of the pendant.

The Cut Master 75 contains a new type of table support bear-



ing which is a combination radial and thrust roller bearing. This feature makes possible production with greater accuracy at higher rates of speed.

Another interesting innovation is the ability to convert the Cut Master Model 75 from a manually operated machine to a completely automatic machine by the installation of the Bullard Man-Au-Trol attachment. This compact unit may be procured with the machine or applied in the field as production requirements dictate without detracting from the manual versatility of the machine.

Other attachments which are available include hydraulic chucking mechanism, angular turning, thread cutting and drum scoring devices and variable speed drive. The machine can also be readily adapted to single or double dimensional contouring controls to meet job requirements

The Bullard designers have stressed and accomplished unit type construction of machine components and smooth external lines for cleanliness and simplification of maintenance.

Complete illustrated literature and detailed specifications may be had from The Bullard Company, Bridgeport, Conn.

Circle Inform-A-Gram No. D4.

EVERY ONE OF THESE "PACKAGED" CONTROLLED-AIR-POWER
DEVICES HAS ONLY ONE REASON FOR EXISTING—
To Help You Get More Production at Less Cost
THE BELLOWS ROTARY FEED TABLE
THE BELLOWS HYDRAIR DRILL UNIT
THE BELLOWS CV-408 AIR VISE
THE BELLOWS TRANSFEED
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The Bellows Co.
AKRON 9, OHIO

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PUBLICATION

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

Cold Pressure Welding. A new general information brochure describing the Utica Koldweld process for cold pressure welding has been announced by the Utica Drop Forge

& Tool Corp., Utica 4, N. Y. The brochure explains numerous applications of Utica Koldweld tools already working in the field. A file section is included in the brochure for recording additional information on Koldweld developments.
Circle Inform-A-Gram No. B1.

"Cleveland Carbide Tipped Tools for Increased Production at Lower Unit Cost" is both title and topic of the Cleveland Twist Drill Co. catalog introducing the company's new line of carbide tipped tools. Valuable features of the catalog are two illustrated sections on the use and care of carbide tipped drills and reamers. Another feature is the full description of each type carbide tipped tool listed in the booklet—drills, reamers, and counterbores. This is a handy carbide tool reference. Get your copy from The Cleveland Twist Drill Co., 1242 E. 49 St., Cleveland 14, Ohio, or—
Circle Inform-A-Gram No. B2.

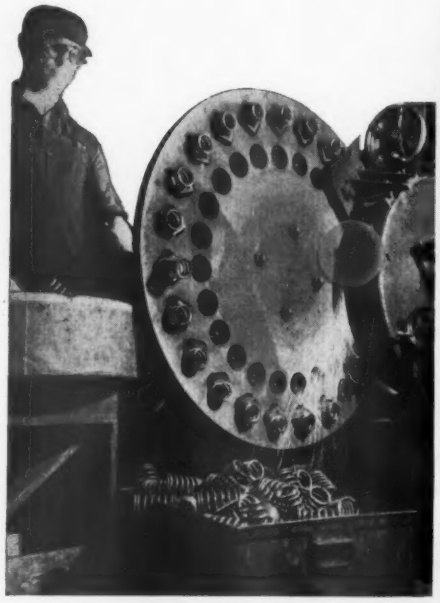
The New Model Duskolector supplements other Hammond Duskolectors. Bulletin 810, now available from Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo, Mich. describes this new machine that helps get rid of dust and dirt.
Circle Inform-A-Gram No. B3.

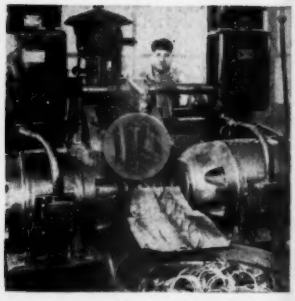
"The ABC of the Repro-Templet Method of Plant Layout," explains and illustrates the advantages of this method of plant layout. The brochure, together with an experimental sheet of Repro-Templets, is available from Repro-Templets, Inc., Oakmont, Pa.
Circle Inform-A-Gram No. B4.

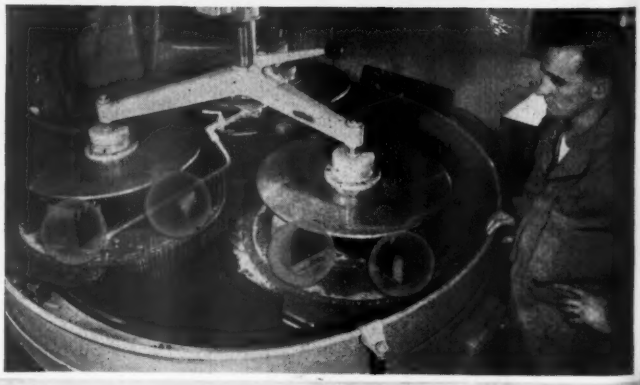
For Continuous Flow of Strip to a processing or fabricating operation the E. W. Bliss Weld-A-Matric splicer end-welds metal strip automatically. Bliss Bulletin 43 describes the company's complete line of splicers in 13 standard sizes which weld ferrous or non-ferrous strip from 8" to 94" in width. E. W. Bliss Co., Rolling Mill Div'n, Salem, Ohio.
Circle Inform-A-Gram No. B5.

Valves. Colored air flow diagrams, exploded views, installation data, and parts lists are only a few of the features of the new 20-page bulletin describing Ross Operating Valve Co.'s 600 and 880 series of hand and foot valves. Ask for Bulletin No. 303-B, Ross Operating Valve Co., Dept 1908, 120 E. Golden Gate, Detroit 3.
Circle Inform-A-Gram No. B6.

Norton covers the entire







CIRCLE INFORM-A-GRAM KEY NO. 86

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

Modern Casting Impregnation with Metaseal Materials is illustrated in an 8-page, two-color brochure available from American Metaseal Manufacturing Corp., 607 65 St., W. New York, N. J. Photographs show how the Metaseal method achieves complete impregnation of porous castings and reduces product rejects in cast and metal powder parts.
Circle Inform-A-Gram No. B7.

A Worm Gear Jack that speeds-up the raising and lowering of movable parts in metalworking machinery is featured in a new manual compiled by Duff-Norton Mfg. Co. Extensive illustrations show some applications for the jack. For complete information ask for Catalog AD-34, Duff-Norton Mfg. Co., Box 1889, Pittsburgh 30, Pa.
Circle Inform-A-Gram No. B8.

disc grinding range

Norton discs are engineered for every type of grinding, on all materials, all machines— to bring you the profit-boosting

"TOUCH of GOLD"

Whatever your disc grinding requirements may be, Norton will meet them exactly — with discs engineered for coolest cutting action and longest, most productive service life. Norton discs of ALUNDUM* and CRYSTOLON* abrasives are made in all grit sizes, all grinding grades, five types of bonds and all types of mountings. They are precision-built, by exclusive Norton processing, to assure closest uniformity of grinding action from disc to disc and lot to lot. Which means that each time you re-order to the same specifications, you'll get the same top performance — next week, next month or next year.

See Your Norton Distributor

for practical aid in selecting the Norton discs that will add the money-saving "Touch of Gold" to every disc grinding job you do. Ask him for the new booklet, "Disc Grinding." Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

What Norton discs have done for others is good evidence of what they can do for you. Check these reports, typical of many from present users:

"Best discs ever received. Produced over 6,000,000 piston rings — 100% more than our former discs, with 50% less dressing. Results duplicated in subsequent shipment."

"Outlasted and outperformed all other discs — gave 366,975 pieces without burn."

"Averaged 21,500 pieces, a new high for this job."

"Outproduced previous discs 2 to 1."

"High above competition for output and grinding quality."

"Gave 20% longer service life."

W-1584

Making better products . . . to make other products better

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

CIRCLE INFORM-A-GRAM KEY NO. 86

Air Powered Vises. An illustrated 4-page brochure describes the many time saving applications of these units in production holding and pressing jobs. Included are many illustrations of how the usefulness of air powered vises is multiplied by using special jaw faces, unusual mounting, and using two or more air vises operating in unison from a single foot controlled valve. Get your copy from Van Products, 3736 W. Twelfth St., Erie 2, Pa. or—
Circle Inform-A-Gram No. B9.

"Toolflex" neoprene mounted floating tool holders are illustrated in a new bulletin from Burg Tool Mfg. Co., Box 48, Gardena Sta., Gardena, Calif. Complete specifications for all sizes and models are included.
Circle Inform-A-Gram No. B10.

Gear Tools. The 56-page Brad Foote List of hobs, cutters, broaches, and special tools for gear-making is designed to help you engineer the gears you need. The items in the book are not for sale, but for making gears by Brad Foote. Use the lists to lay out gears so they can be made from existing tools, saving considerable expense. Request the Hob List from Brad Foote Gear Works, Inc., 1309 S. Cicero Ave., Cicero 50, Ill.
Circle Inform-A-Gram No. B11.

Gage Blocks. Consistent with their over-all expansion program, the Jansson Gage Co., 13550 Auburn, Detroit 39, Mich., has issued a 19-page catalog presenting their extended line of extreme-tolerance

gage block sets, sine bars, tri-squares, and accessory sets. Included in the catalog are hints on proper gage care and information on Jansson's inspection service for gage blocks of all makes.
Circle Inform-A-Gram No. B12.

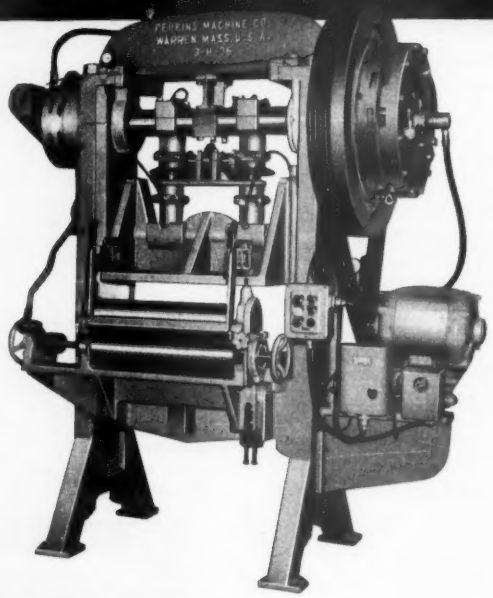
Presses of all types — air, arbor, drill, foot, etc. — manufactured by Famco Machine Co., Kenosha, Wisc. are pictured and explained in the company's catalog, "Famco Cost Cutting Machines."
Circle Inform-A-Gram No. B13.

Filters. The Kleenall combination magnetic and fabric filter is completely illustrated in 16-page Bulletin 350C. A 20-point check list serves as a guide in selecting coolant cleaning equipment. Barnes Drill Co., Filtration Div'n, 862 Chestnut St., Rockford, Ill.
Circle Inform-A-Gram No. B14.

Plug and Ring Gages by DeKalb are listed in the company's 12-page catalog. Besides gage specifications and illustrations the catalog contains information on how to order plug gages. Write to DeKalb Precision Industries, Waterman, Ill., for your copy. **Inform-A-Gram No. B15.**

Circular Sawing. The Triple Chip method of circular sawing is explained in the Motch & Merryweather circular sawing equipment brochure. Write to Motch & Merryweather Machinery Co., Cleveland 13, Ohio, or—
Circle Inform-A-Gram No. B16.

The PERKINS 3-H-36 PRESS



ARRANGED FOR
HIGH SPEED PRODUCTION!

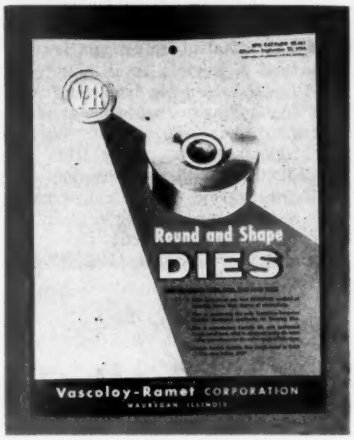
45 Ton Capacity with Air Clutch and Air Brake. Front to back Feed Rolls. Presses of this type built in capacities from 20 to 200 Tons. Bed widths up to 72". Can be furnished plain or geared.

PRESSES BUILT TO SPECIAL SPECIFICATIONS

Perkins Power Presses SINCE 1885
PERKINS MACHINE CO.
WARREN, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 881

A Three-Section Die Catalog containing complete information on all V-R dies for drawing wire, rod, bar, and tube, is available from Vascoloy-



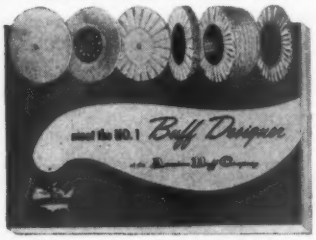
Ramet Corp., Waukegan, Ill. Sections cover round hole dies, square and hexagon shape dies, and rectangular shape dies for easy reference. Ask for Catalog VR-461.
Circle Inform-A-Gram No. B17.

WLS Speedtooling gives you precision stampings in small lots at lower costs because tool charges are made only on the first order. WLS will send a sample stamping with price quotations for that piece, and a bulletin on the company's operations. Contact WLS Stamping Co., 3292 E. 80 St., Cleveland 4, Ohio.
Circle Inform-A-Gram No. B18.

Storage and Material Handling Equipment is featured in Catalog H-4 of the Bernard Franklin Co., Inc. Many items added to the company's standard line of steel shelving, cabinets, bins, trucks, etc., are described

with detailed information on applications, construction, and specifications. Write to Bernard Franklin Co., Inc., Dept TP 47, Bath and Hedley Sts., Philadelphia 37, Pa.
Circle Inform-A-Gram No. B19.

Special Buff Designs and several new types of automatic buffs are featured in the new 12-page American Buff Co. Catalog. The catalog il-



lustrates the company's patented "Centerless" construction and air-cooled Permanent Centers. American Buff Co., 2414 S. LaSalle, Chicago 16.
Circle Inform-A-Gram No. B20.

"The Con-Tour," a new bi-monthly brochure covering various subjects in metal working, electronics, etc., is being published by Continental Tooling Service, Inc. Those requesting the first issue will be put on the regular mailing list. Requests should be made to Continental Tooling Service, Inc., 19 W. Fourth St., Dayton, Ohio.
Circle Inform-A-Gram No. B21.

Conveyor News. A two-color brochure describes how "10 Things Hired Hands Can't Do Become 10 Ways That Junior, the Light Weight Trolley Conveyor, Can Cut Production Costs." This Bulletin 954 is from Jervis B. Webb, 8933 Alpine Ave., Detroit.
Circle Inform-A-Gram No. B22.

Designers and Production Men will find the Lavallee & Ide Comparative Reamer Selector ideal for use in setting up production plans, as every reamer available in a given size is contained on a two-page spread, allowing easy comparison and selec-

tion. Every reamer is illustrated, described by type, shank, flute, length, and list number and price in easy to read style. Get your copy from Lavallee & Ide, Inc. Chicopee, Mass, or—
Circle Inform-A-Gram No. B23.

Homer Magnetic Steel Sheet Separators are fully described in a catalog page — Form SS-210 — available from The Homer Manufacturing Co., Inc., Dept 382, Lima, Ohio. These Separators are portable, permanent, and non-electric.
Circle Inform-A-Gram No. B24.

"Industrial Air Hose Valves" shows how the P-K Paul valve operates for air blow applications with only two moving parts. A cutaway drawing illustrates the operation. Get your copy from P-K Industries, Inc., 27 Porete Ave., N. Arlington, N. J.
Circle Inform-A-Gram No. B25.

Milling Machine. An attractive 8-page brochure describing The Producto Machine Co.'s special-purpose, hydraulically operated, automatic production milling machine is offered by the manufacturer. Write to Producto at Bridgeport, Conn., or—
Circle Inform-A-Gram No. B26.

The Facilities Brochure of the Rockford Die & Tool Works shows photographs of various departments and illustrates a number of the intricate precision parts produced by the firm. Rockford Die & Tool Works, Inc., Rockford, Ill.
Circle Inform-A-Gram No. B27.

Save labor...

cut costs with

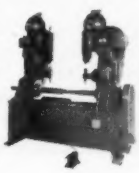
FASTER ***Riveting and Clinching!***

T-J

RIVITORS

T-J RIVITOR used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.

DOUBLE RIVITOR sets two rivets at a time! Equipped with 10" hoppers, and tooled to automatically feed and set two ¼" dia. x ⅝" long wagon box head rivets at a time in elevator chain and raddle or elevator flight assemblies for farm implements. Controlled by one foot pedal.



Automatic
Feeding and Setting

T-J meets your needs for labor-saving SPEED in assembly . . . with performance-proved Rivitors and Clinchors for many jobs today...in aircraft, automotive, farm machinery, stampings of all kinds.

T-J CLINCHORS set clinch nuts 3 to 5 times faster! Fully automatic controlled by a single foot pedal! Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J RIVITORS automatically feed and set solid rivets . . . with high production! Electrically powered Rivitor sets 1/16" to ¼" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅜" diam. and up to ¾" long. Throat depths 8" to 36".

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Co., Jackson, Mich.

CLINCHORS

T-J CLINCHOR . . . one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. Feeds and sets 11/16" square cased nuts in outside quarter panels, left and right hand.

DOUBLE CLINCHOR sets two nuts at once! Tooled to feed and set ⅜" x ½" x 1/16" thick Fabri-Steel nuts at each operation. Both Clinchors tripped by same foot-operated valve. Adaptable to wide range of clinch nut setting problems.

38 YEARS EXPERIENCE T-J

TOMKINS-JOHNSON

RIVITORS · AIR AND HYDRAULIC CYLINDERS · FITTINGS · CLINCHORS

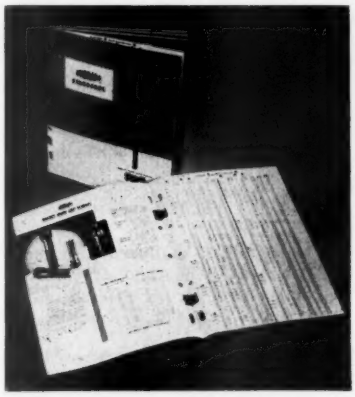
CIRCLE INFORM-A-GRAM KEY NO. 891

Leaded Alloy Steel. Rycut 40, said to be the world's fastest machining alloy steel in its carbon range (0.40 carbon), is described with case studies showing machining comparisons and cost-savings in Bulletin 14-5 from Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill.
Circle Inform-A-Gram No. B28.

Sciaky Air Operated, press type, low impedance, single phase, spot and projection welders, Series SP2 and EP2, are covered in Bulletin 317-2 of Sciaky Bros., Inc., 4915 W. 67 St., Chicago. The two-color booklet is complete with application stories, photos, schematic drawings, and tabular data describing the SP 2 and EP 2 and also the ESP 2 Combination Projection-Spot welder.
Circle Inform-A-Gram No. B29.

Aluminum Extrusion process is fully explained in a new circular by Precision Extrusions, Bensenville, Ill. Of value to designers and engineers is a 2-page specification table listing the physical properties and recommended applications for the 14 most generally used alloys. Ask for "Precision Extrusions."
Circle Inform-A-Gram No. B30.

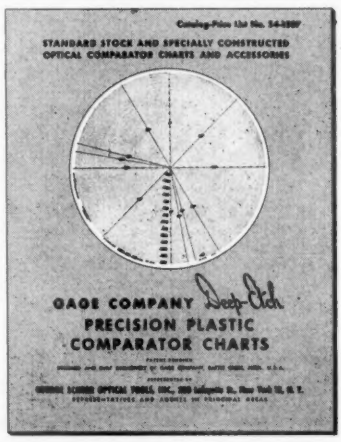
"Unbrako Standards" describes in pictures and text the Standard Pressed Steel line of Unbrako precision threaded fasteners — socket screws, set screws, etc. Applications



of each product are indicated in line drawings, and cutaway drawings emphasize the special features of each. Copies are available from Standard Pressed Steel Co., Box 600, Jenkintown, Pa.
Circle Inform-A-Gram No. B31.

Precision Instruments manufactured by W. C. Dillon and Co., Inc., are comprehensively listed in the company's new and expanded General Bulletin 19-F. Specifications for Dillon materials testing, mechanical pressures and heat measurement and static load testing equipment are illustrated in the catalog. Write to Dillon & Co., Box 3008, Van Nuys, Calif., for your copy.
Circle Inform-A-Gram No. B32.

Optical Comparator Charts and projector accessories are completely described and priced in a new 24-page catalog. Visual templates for 1:1 inspection are illustrated, to-



gether with projector work stages designed and built to order. Catalog No. 54-1507 is available from the Gage Co., Battle Creek, Mich.
Circle Inform-A-Gram No. B33.

with a **NORBIDE®** Dressing Stick

JUST a couple of passes with a handy NORBIDE Dressing Stick is all it takes to clean up a wheel face, dress a radius or groove or touch up a cup or saucer wheel. And with this conveniently sized stick you can see more of the wheel and thus avoid costly overdressing.

A NORBIDE Stick of boron carbide—the hardest material made by man—will outlast hundreds of ordinary abrasive sticks. You'll find it will greatly reduce dressing dust nuisance also.

Order a supply of these cost-cutting sticks from your local Norton distributor or write for Form 1567 giving more details.

NORTON COMPANY, 47 New Bond Street, Worcester 6, Mass.

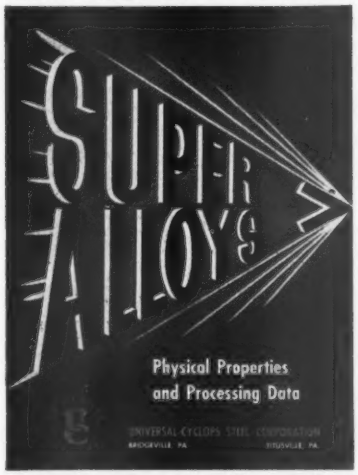
NORTON® BORON CARBIDE

Next to the diamond in hardness— available at a fraction of diamond cost

CIRCLE INFORM-A-GRAM KEY NO. 90

Over 300 Sizes of Ball Bearing precision and super precision die sets are listed in Lempco Products' 7th edition Catalog of anti-friction die sets, guide post assemblies, and accessories. The 192-page book is conveniently divided into seven sections with tab indexes to each section. Die set dimensions are clearly shown and cross referenced in accompanying charts. Write to Lempco Products, Inc., Bedford, Ohio, for your Precision Die Set Catalog.
Circle Inform-A-Gram No. B34.

Super Alloys. Universal-Cyclops Steel Corp. has just published a brochure on Super Alloys — high strength heat and corrosion resistant materials. Included in the brochure's 20-pages are notes on uses and characteristics of some of the company's Super Alloy grades, tables and charts illustrating the properties of these materials, and forms in which they are available. Much of the material has not been published previously by any other steel manufacturer. Send your request to Universal-Cyclops Steel Corp., Dept. 12, Bridgeville, Pa.
Circle Inform-A-Gram No. B35.



Automatic Drilling Units are presented in an illustrated bulletin offered by Electro-Mechano. All vital details about the company's Models 110 (column mount) and 111 (pad mount) small hole drilling units is given. Write to Electro-Mechano, Milwaukee, Wisc., for your copy.
Circle Inform-A-Gram No. B36.

"The Nerve System of Controlled Manufacturing is Communications" is both a message and booklet from TelAutograph Corp., originators of instant handwritten communications systems. The booklet, an extremely attractive 16-page, 8-color publication, illustrates and analyzes six basic manufacturing problems which can be alleviated by planned plant communications. TelAutograph Corp., 16 W. 61 St., New York 23.
Circle Inform-A-Gram No. B37.

Hy-du-lignum is a laminated, compressed, hardwood die stock material. An interesting brochure has been prepared by the Hy-du-lignum Co., 35 Lowell Rd., Concord, Mass., summarizing the features and uses of this tooling material and introducing it to American industry.
Circle Inform-A-Gram No. B38.

CHIP-HOG
Heavy Duty Turning Tools

GAIRING

For Maximum Feeds & Speeds on Any Machine

SAVE ON GRINDING COSTS with replaceable carbide inserts. They're furnished by us or by carbide manufacturers with pre-formed front and side clearance angles and ground seating surfaces.

LONG CARBIDE LIFE insured by two-way adjustment; forward by built-in adjusting screw, sideways by serrated clamp. Buttress serrations will not slip, hold carbide rigid.

DURABLE SHANK of special high-alloy steel, heat-treated for toughness and rigidity, outlasts many brazed tools. Tool steel anvil under carbide allows harder carbide grades, protects shank.

3 HOLDER STYLES, each right- and left-hand, made for straight turning, plunge cutting, and turning to shoulder.

TYPICAL CASE HISTORIES

Gun Barrels, heat treated steel castings, 280 to 340 Brinell, 9" to 11" dia., cut 1/2" to 3/4" deep, 34 RPM, .032" feed.

Worm Shafts for Speed Reducers, 4140 SAE steel, 5" dia., cut 3/8" to 1-1/4" deep at 250 SFM, .011" feed.

WRITE FOR CHIP-HOG BULLETIN AND PRICE LIST

The GAIRING Tool Company

21227 HOOVER ROAD • DETROIT 32, MICHIGAN

COUNTERBORES · E CON-O-MILLS · BORING BLOCKS & BARS · FINE BOOTH CUTTERS · SPADE DRILLS · SPECIAL TOOLS · CHIP HOG TURNING TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 911

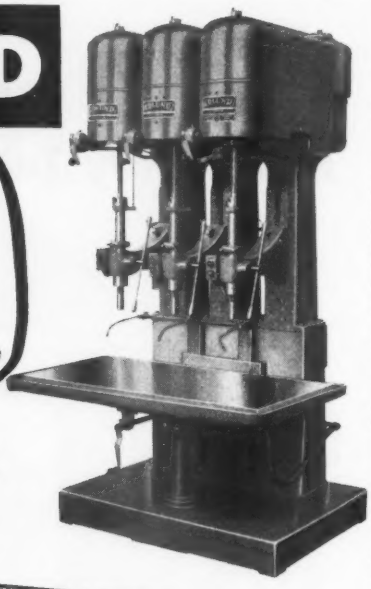
Automatic Conveyor Lubricators by J. N. Fauver Co., Inc., are featured in revised Catalog No. CL849. The catalog contains a supplement announcing a new 700 series which handles either oil or grease automatically. The 6-page catalog is available from J. N. Fauver Co., Inc., 50 W. Hancock, Detroit 1, Mich.
Circle Inform-A-Gram No. B39.

Drill Jigs. The spiral bound Flip-a-page drill jig catalog No. B-649, published by Colonial Bushings, Inc., is a handy manual of drill jig bushing liners and bushings. Printed on heavy paper which will withstand hard usage, the catalog contains the usual tabulated specifications, along with pertinent general information about bushings. Get your copy from Colonial Bushings, Inc., 31780 Groesbeck Highway, Fraser, Mich.
Circle Inform-A-Gram No. B40.

Benco Master Pusher Kits are featured in a folder available from The Benco Collet Manufacturing Co., Cleveland 14, Ohio. Also included in the folder is information on Benco chuck nuts, collets, collet sleeves, and stock-stops for Brown & Sharpe machines.
Circle Inform-A-Gram No. B41.

EDLUND

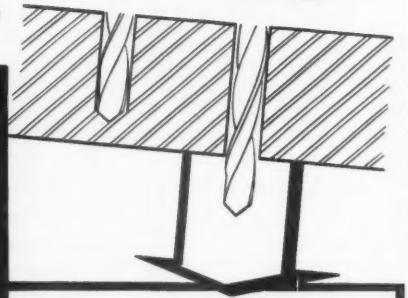
Cuts Cost $1280.... On One Job.*



An EDLUND 2F Variable Speed Drilling and Tapping Machine Makes the difference

The Edlund 2F instant change variable speed feature lets you find correct drilling speed under practical on-the-job conditions. Saves valuable production time. No gear or belt changes necessary. Increases tool life by using correct drilling speed for each job requirement.

Standard or Special Models, 1 to 8 Spindles. 8", 12" or 15" overhang — capacity to 1¼". Available with Power Feed, Reversing Motor Tapper, Lead Screw Tapper, and Back Gears.



The job . . . drilling 7/16" hole 1½" deep in X1020 steel. The Edlund Variable Speed machine drilled 135 pieces per hour compared with 108 pieces per hour for standard machine production. The 25% increase in production reduced costs $1280.*

Write for Bulletin #140, a colorful, illustrated booklet describing the Edlund 2F. Specifications and quotations prepared promptly on request . . . with no obligation on your part.

*Case history folder #SF on request.

EDLUND MACHINERY COMPANY
Cortland, New York Division of Bradley Edlund Corp. Affiliated with Precision Castings Co., Inc.

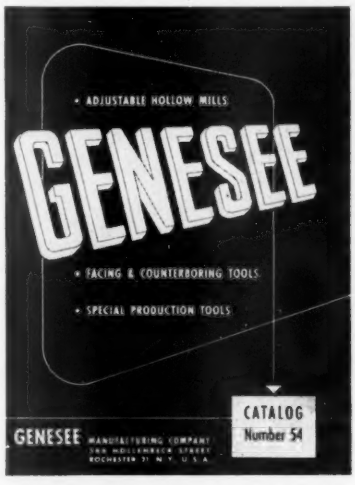
EDLUND REPRESENTATIVES IN MAJOR CITIES
CIRCLE INFORM-A-GRAM KEY NO. 921

Lathes. A special feature of "Stevens Polishing & Buffing Lathes" is a comparative chart outlining all standard specifications and important features of each Stevens lathe model in easy-to-read form for ready selection of the right model for any particular job requirement. Ten constant speed lathe models and four featuring variable speed operations are listed in Bulletin TP-55 from Frederic B. Stevens, Inc., 1800 18th St., Detroit 16, Mich.
Circle Inform-A-Gram No. B42.

Modern Design in Fluid Power Cylinders. The Hannifin square type Series "A" air or oil cylinders described in Bulletin 213 contain the externally removable Hannifin Cartridge Gland, introduced last spring in the company's Series "H" hydraulic cylinders. The cylinders are offered in 11 bore sizes from 1½" to 14", in a wide selection of mounting styles. Send for Bulletin 213, Hannifin Corp., Des Plaines, Ill.
Circle Inform-A-Gram No. B43.

New Transformer. A 6-page brochure explains the construction and operation of the Vernistat, new type precision variable-ratio transformer. Performance curves, application schematics, specifications, and step-by-step drawings illustrating the combination auto-transformer and potentiometer mode of operation of the Vernistat are in the brochure. Vernistat Div'n, The Perkin-Elmer Corp., Norwalk, Conn.
Circle Inform-A-Gram No. B44.

Tools. Genesee Catalog No. 54 presents the company's line of adjustable hollow mills, facing and counterboring tools, and special production tools, with photos and drawings



to supplement the text and specifications tabulations. The big, attractive catalog is available from Genesee Mfg. Co., 566 Hollenbeck St., Rochester 21, N. Y., or —
Circle Inform-A-Gram No. B45.

Air Tools of all types, from screw drivers to sanders to drills, grinders, etc. are illustrated and described in Rotor Tool's new air tool catalog No.

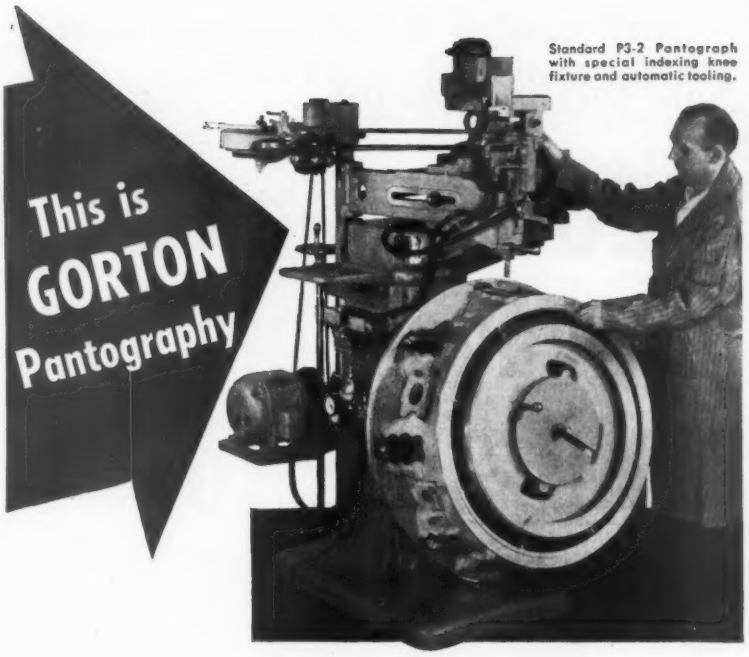
38A. The 56-page booklet is filled with informative drawings and photos. The Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 23, Ohio, will supply you with a copy.
Circle Inform-A-Gram No. B46.

Valves of All Types and Sizes are covered in The F. C. Kingston Co.'s big, complete catalog. Periodic bulletins of new products and data are inserted in the expandable catalog as the need arises. Contact The F. C. Kingston Co., 1007 N. Main St., Los Angeles 12, Calif., for your copy, or—
Circle Inform-A-Gram No. B47.

The Tru-Rol Line of Cylindrical Roller Bearings is fully described in catalog TR-854-DC of the Rollway Bearing Co., Syracuse, N. Y. Listing Tru-Rol bearing types, sizes, dimensions, and lead ratings, as well as detailing their "crowned" rollers — a feature that relieves high stress areas at the roller ends — the catalog is available from the manufacturer.
Circle Inform-A-Gram No. B48.

Installation Accessories for lubrication, hydraulic steam, liquid, and air applications are presented in Catalog No. 17-D, recently released by the J. N. Fauver Co., Inc., 51 W. Hancock, Detroit 1, Mich. The 16-page catalog contains complete information, specifications, and prices on adapters, couplings, nipples, hose anchor fittings, tube fittings, etc.
Circle Inform-A-Gram No. B49.

Air Power. Mead's Industrial Air Power Catalog for 1954 is 50-pages jam-packed with information and statistics on air cylinders and all types of air operated devices, such as presses, work feeders, impact hammers, etc. Special pages scattered throughout the brochure give examples of air power set-ups. Mead Specialties Co., Inc., 4114 N. Knox Ave., Chicago 41.
Circle Inform-A-Gram No. B50.



Standard P3-2 Pantograph with special indexing knee fixture and automatic tooling.

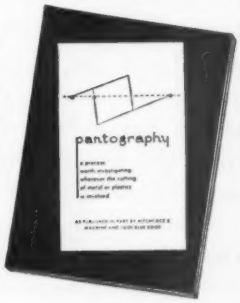
...Ready to Help You

Photo shows a standard P3-2 profiling ports in an aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic. A combination of other methods would do the cutting in hours, but the P3-2, with an automatic cutting cycle, finishes each port in 2.3 minutes.

Improve Production and Lower Costs

Gorton tracer-controlled equipment does efficient profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving and many other standard or special operations. You can expect high accuracy and high surface finish, whether your work involves metals or plastics in flat, uniformly curved, cylindrical or irregular shapes.

Enlarged templates, masters or patterns, all quickly and easily made, give Gorton Pantographs advantages of increased accuracy through reduction ratios. Work pieces range in size from the diameter of a dime to 10 feet. Cutting cycle is accomplished manually or automatically.



Fill out and mail the coupon for your copies of the Gorton catalog and the informative booklet, "Pantography."

GEORGE GORTON MACHINE CO.

1212 Racine St., Racine, Wis., U.S.A.

Please send at once complete information about the Gorton line contained in Bulletin 1655-1212.

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A 7786-⅔

CIRCLE INFORM-A-GRAM KEY NO. 931

New facilities mean . . .

DIECO's famous die sets now available in KING-SIZE too!

As a subsidiary of E. W. Bliss Company, we are able to use their virtually unlimited machining facilities for the production of "giant" die sets.

With these facilities we can produce the largest die sets in use today.

What is more important, however, is that Dieco takes the same pains with large die sets as with the small: holes are precisely bored, pins and bushings fitted and aligned with care, plates inspected to assure perfect parallelism. In short, all the underlying design principles of our famous "finger-tip action" die sets—designs which have won unqualified approval from diemakers—are now available to users of large, special die sets.

Whatever your die set problem—large or small, standard or special—a Dieco engineer will be glad to help you. Call him into your pressroom, let him demonstrate to you why and how Dieco die sets will mount easier, last longer under even the toughest of conditions.

Call your local DIECO office Today!

CLEVELAND, O.	1400 Brookpark Rd., SHadyside 1-9000
DETROIT, MICH.	20201 Sherwood Avenue, FOrrest 6-2480
PITTSBURGH, PA.	122 S. Sheridan Ave., EMerson 1-0040
DAYTON, O.	Die Supply Sales Co., 311 Vermont Ave., MI 9691
BUFFALO, N. Y.	440 Terrace Blvd., Depew, N. Y. REgent 6767-3
ST. LOUIS, MO.	Scott Special Tools, Inc., 1252 N. Kingshighway, FOrest 3454
BIRMINGHAM, ALA.	Production Tooling Service, 422 N. 24th St., 4-9081
CHARLOTTE, N. C.	Apex Machine Tool Supply, Inc., 3107 Wilkinson Blvd., FR 6-6521
NASHVILLE, TENN.	Ralph Landrum Tool and Die Supplies, 1107 Granada Ave., 28-7208

All die sets the same? Not at all—write today for Catalog 70 and learn how Dieco differs.

BLISS
SINCE 1857

THE DIE SUPPLY CO.
1400 Brookpark Road, Cleveland, Ohio
a subsidiary of E. W. BLISS COMPANY

DIECO

Industry's most complete line of die sets and die makers supplies

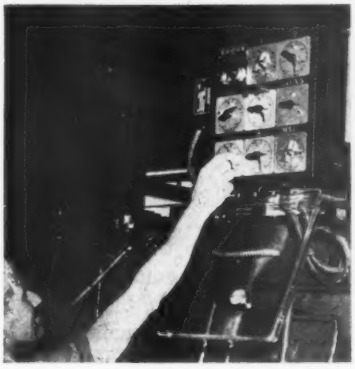
DIE SETS · GUIDE PINS · BUSHINGS · SPRINGS · SOCKET HEAD SCREWS · 5001 ITEMS

CIRCLE INFORM-A-GRAM KEY NO. 941

MECHANICAL UNIT CONTROLS TOOL LIFE, COSTS

The Cross Toolometer is proving its value in many metalworking plants by reducing tool costs, decreasing sharpening expense, and increasing machine efficiency.

The Toolometer is basically an automatic counter which provides a continuous picture of the used and unused portions of tool life for a particular tool. The mechanical control unit is available in four sizes with one, two, four, or eight Toolometers. They are used on all types of metalworking equipment including screw machines, drill presses, gear hobbers, etc.



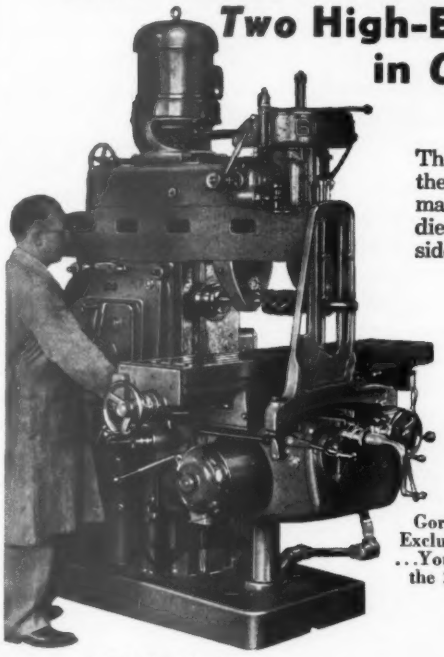
Operation of the unit is simple. The pointer on each meter is set at a point representing the expected output of pieces per tool sharpening. It indexes counterclockwise with each machine cycle and when the pointer reaches zero, the machine automatically shuts down for a tool change.

The danger zone or last useful period of tool life is marked in red. If a unit with more than one Toolometer is used, the operator groups all tool changes and when the Toolometer stops the machine for a specific change, tools indicated in the danger zone on the other meters are also replaced.

Users of the Cross unit find reduced downtime and scrap loss because tool changes are grouped and the use of dull tools is eliminated. The Cross Co., Dept. 57, Detroit 7, Mich., will supply further details on this tool meter.

Circle Inform-A-Gram No. D5.

New Gorton 2-28 Brings You *Two* High-Efficiency Mills in *One* Money-Saving Unit



. . . as a horizontal mill.

The Gorton Receptor Ram makes the new 2-28 a true multi-purpose machine . . . "tailor-made" for *all* die-mold-machine shops. Consider the facts:

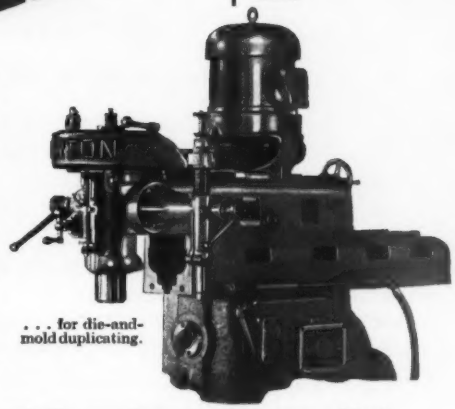
Gorton Exclusives . . . Yours in the 2-28

HORIZONTAL MILL

VERTICAL MILL (Super-speed)

DUPLICATOR (Simply add a duplicator head and a duplicator table.)

NOTE: You can switch from horizontal to vertical high-speed milling in 5 minutes or less. Save space and capital equipment — and increase production facilities at the same time.



. . . for die-and-mold duplicating.

- Fullwidth knee, 24½ inches wide, provides extreme rigidity. Even under heavy cutting loads, there's no sag or twist.
- New lubrication system dissipates heat to prevent spindle "growth" . . . to promote full use of spindle horsepower . . . to end the necessity for adjusting cutter depth to compensate for differences between "hot" and "cold" operation.
- High-speed head delivers spindle speeds up to 4000 rpm. Horizontal spindle: up to 2000 rpm — 7½, 10 or 10/5 hp *at spindle nose.*
- Double-extension feature of the Receptor Ram greatly increases work area, vertical capacity and transverse cutting capacity on either the Gorton 2-28 or 3-34 Horizontals.
- Down time and maintenance are drastically reduced by *true* unit construction features. A removable coolant pan speeds sump cleaning and coolant changing.
- Overload protection automatically safeguards expensive cutters. A horsepower-load meter constantly indicates cutter condition and operating efficiency.
- Full directional front and rear controls are interlocked.

You can't afford to overlook this Gorton Horizontal with Receptor Ram. It could produce more profit per dollar invested than any other machine you have. Fill out and mail the coupon.

GEORGE GORTON MACHINE CO.

1212 Racine St., Racine, Wis., U.S.A.

Please send at once Bulletin 1655-1212 and data on Gorton Horizontals.

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A 7788-2/3

CIRCLE INFORM-A-GRAM KEY NO. 951

. . . Three Holding Fixtures, from page 61

other design requirements in the finished part. In general, such thickness variations cannot be produced so rapidly or cheaply by any other means, if at all, and would normally require either forging or machining to reduce thickness over considerable areas.

Figure 3 shows one cold coining die that produces the small stamping appearing next to the die. Subsequently, the coined blank is trimmed to a somewhat key-like shape and later is drilled and formed to yield the finished part called a ratchet type counter control lever. In the coining operation, a blank of 1010 cold rolled steel 0.078" thick is used and coining reduces the thickness over most of the area to 0.047" but throws up some bosses which are later trimmed off.

Although the part is quite small, the work is done in a No. 22 Bliss press of the knuckle joint type and having 150-ton capacity. 500 to 600 pieces an hour are coined. Location of the blank in the die is by a pair of thin pivoted strips as shown in the illustration, these being cut out to fit blank contour. Coining dies must be relieved at some points because if the blank was confined at all points and happened to have a volume exceeding that of the cavity, pressure created might break the die or the press. With suitable relief, into which any excess metal can flow, breakage seldom occurs. It is necessary to trim the part, however, unless considerable variation in contour can be tolerated.

Blanks to be coined preferably are plated with cadmium, which acts as a lubricant where flow occurs. When cadmium is not available, however, use of castor oil as a lubricant gives satisfactory results.

—— • ——

"Booking" Technique Extends Application of Frozen Mercury Process

The design of parts possessing far greater complexities is now possible through the frozen mercury process of investment casting because of an important feature known as "booking". This feature permits two or more pieces of frozen mercury to be almost instantly joined with only the slightest pressure.

Accordingly complex patterns possessing interior coring and gating so intricate as to make them impossible or impractical by other methods, can be easily and economically produced by the frozen mercury process.

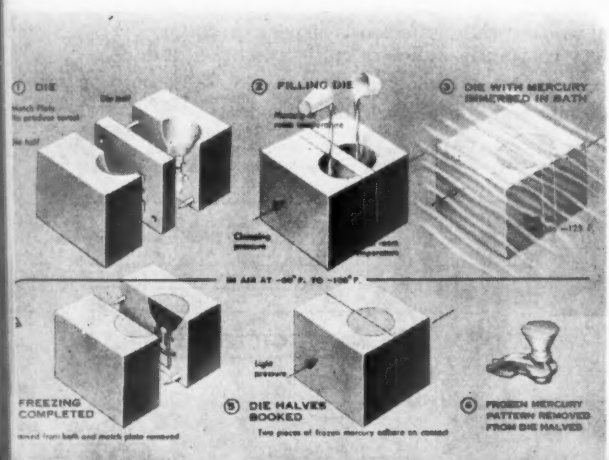
To accomplish this, the original die may be made in two identical halves, separated as a completed unit by a match-plate that is perfectly smooth on both sides. The two halves are linked with dowel pins extending through the match-plate.

Liquid mercury is poured into the two die halves. When the material is frozen, the die is opened and the match-plate removed. Then, the two sides of the die, aligned by dowels, are placed together, bringing the opposing smooth surfaces of the two halves of the frozen mercury pattern into a perfect face-to-face contact.

When the halves are in contact, a slight squeeze or a gentle tapping against the die is sufficient to cause the frozen mercury to weld its surfaces to unite the two halves into a single monolithic pattern.

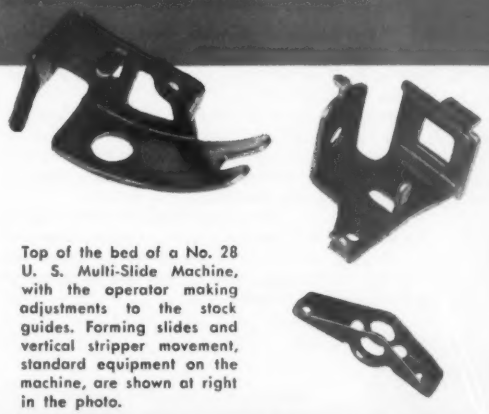
Patterns have been made with as many as twelve separate "booking" operations. Thus, single-unit finished castings possessing amazing complexities are easily possible and practical — far beyond the potentialities of any other process.

Because of the large and intricate castings that can be produced, additional cost savings are available since what were entire assemblies can now be purchased as a single unit. Accordingly, savings are realized through the elimination of assembly operations, greatly reduced inventories of many individual parts, and the elimination or major reduction of required subsequent machining.

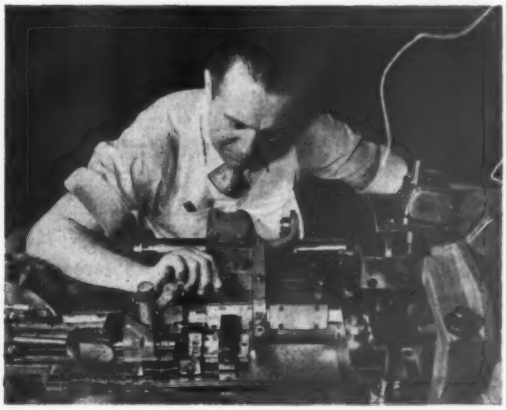

① DIE
② FILLING DIE
③ DIE WITH MERCURY IMMERSED IN BATH
FREEZING COMPLETED
⑤ DIE HALVES BOOKED
⑥ FROZEN MERCURY PATTERN REMOVED FROM DIE HALVES

YOU CAN PRODUCE PARTS LIKE THESE ON THE U.S. MULTI-SLIDE®

U. S. Multi-Slide being tooled up at our plant prior to shipment. U. S. Multi-Slide Machines, when sold with tooling, are tested in actual production on your part and with your stock before being shipped.



Top of the bed of a No. 28 U. S. Multi-Slide Machine, with the operator making adjustments to the stock guides. Forming slides and vertical stripper movement, standard equipment on the machine, are shown at right in the photo.



Bulletin 15-P contains complete specifications for all four sizes of U. S. Multi-Slide Machines. Ask for a copy.

All the parts shown here were tooled for production in U. S. Multi-Slide® Machines by the General Tool and Engineering Company, Dayton, Ohio. They illustrate just a few of the many different types of parts which can be produced complete in the U. S. Multi-Slide — without secondary handlings and at profitable high production rates.

The feed unit, ram, forming slides and vertical stripper (which are included as standard equipment) make it possible to produce complete parts of complicated nature to close tolerances at each stroke of the machine. The U. S. Multi-Slide may be tooled up to perform trimming, piercing, shearing, embossing, swaging and forming operations in a great variety of combinations.

You, too, can reduce labor costs, increase production and improve quality by using U. S. Multi-Slides for the production of your precision formed stampings.

U.S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers
U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories

CIRCLE INFORM-A-GRAM KEY NO. 971

HIGHER SPEEDS!
FASTER GRINDING!

kipp

AIR GRINDERS

Model JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

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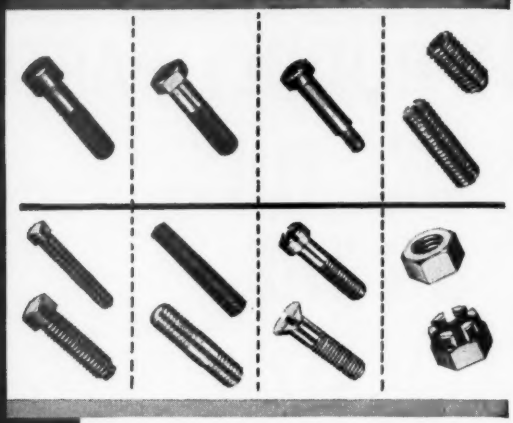
MADISON-KIPP CORP.
212 Waubesa St. • Madison 10, Wis., U.S.A.
CIRCLE INFORM-A-GRAM KEY NO. 981

Cut Assembly and Production Costs with "CHICAGO" Standard Threaded Products



For whatever purpose, production or maintenance, "Chicago" Threaded Products for 82 years have been precision made to assemble faster with less "on the job" trouble.

Specify standard sizes for faster deliveries, greater savings over "specials" and less downtime. Our more complete stocks mean "at once" shipments when you need them—no production delays—no maintenance "shut downs"—no large inventories necessary.

The "Chicago" line of threaded products is a complete line, available from the stocks of your service-conscious Industrial Supply dealer—in bulk or in packages for original equipment or replacement. Ask him for samples—he will gladly supply them.

This new 36-page catalog tells the whole story of the "Chicago" complete line of threaded products. Ask for your copy today.

All "Chicago" Screw Products come packed in strong, easier-to-see packages. Color coded labels mean faster selection, greater savings of time in your stockrooms.

HIGHLIGHTS OF THE "CHICAGO" LINE:

★ High Carbon Heat Treated Cap Screws give added wearing qualities due to uniform hardness through entire thread structure. Ideal for all heavy-duty equipment.

★ Larger size Hexagon Head Cap Screws than normally stocked are available for immediate shipment.

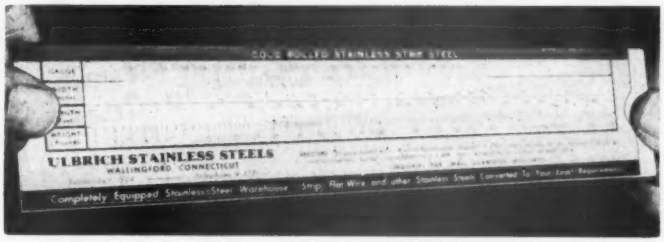
★ Anti-corrosive "Chicago" stainless steel and brass fasteners in a large range of sizes and styles available for immediate shipment.

The CHICAGO SCREW COMPANY
2519 W. Washington Boulevard
Bellwood, Illinois

"SAFETY PLUS" Socket Set Screws, alloy and stainless • Socket Head Cap Screws, alloy and stainless, Flat Head, alloy • Socket Head Stripper Bolts • Socket Pipe Plugs • Square Head Dog Point Set Screws • Socket Keys and Key Kits • "CHICAGO" Hexagon Head Cap Screws, bright, heat treated, stainless and brass • Square Head and Headless Set Screws • Fillister and Flat Head Cap Screws • Milled Steel Studs • Hexagon Nuts, steel and brass • Castle Nuts • Taper Pins

CIRCLE INFORM-A-GRAM KEY NO. 982

Use postage-free Inform-A-Gram Key Number Card for your request



Slide-Rule Type Calculator for Buying Stainless Steel Strip

Using as variables the length and weight of cold rolled stainless steel strip, this calculator quickly and simply translates into pounds any length and width of stainless according to its gauge. On the reverse side of the calculator is a slide table to determine the weight of stainless coil steel, using as variables the coil's inside and outside diameters. Get your calculator from Ulbrich Stainless Steels, Wallingford, Conn., or—
Circle Inform-A-Gram No. C1.

Case Histories Help evaluate your own production schedule. The Bodine Corp., Mountain Grove Ave., Bridgeport 5, Conn., is offering a booklet of 12 "Bodine Case History Bulletins," which describe actual examples of the company's automatic equipment as utilized by various manufacturing concerns. Each "history" provides an illustration of the machine involved and the part made, part drawings illustrate the sequence of operations, production capacity, specifications, and other pertinent data. A phantom drawing and simplified explanations illustrate the basic design of automatic multi-spindle machines for drilling, tapping, milling, screw inserting, and assembly of small parts.
Circle Inform-A-Gram No. C2.

68 New Tracing Templates of De-Sta-Co Toggle Clamps are available, at no cost, to engineers, draftsmen, as well as engineering and designing organizations. Sets of template drawings come in sturdy manilla envelopes. The kits are available in any one or all of three sizes—full—, half—, or quarter-scale. They include drawings of all recent models of De-Sta-Co Clamps, and all of the later refinements on established models. Send your template request to Detroit Stamping Co., 344 Midland Ave., Detroit 3, Mich.
Circle Inform-A-Gram No. C3.

Gypsum Cements for Tooling. United States Gypsum Co. has prepared a technical bulletin of basic fundamentals for industrial tooling with their Hydrocal gypsum cements. Bulletin No. ITT-100-A outlines physical properties and characteristics of the Hydrocal cements and gives basic techniques for handling the material. A shop equipment section shows the proper equipment for making gypsum cement patterns and models. U. S. Gypsum Co., 300 W. Adams St., Chicago 6.
Circle Inform-A-Gram No. C4.

"Glossary of Terms For Producers and Users of Iron Castings" is a 36-page pocket-size booklet explaining over 150 technical terms used in common between suppliers and users of ferrous and non-ferrous castings. It should prove useful to the designer, machinist, and purchaser of castings as well as to the man in a foundry. Get your copy from The International Nickel Co., Inc., New York 5, N. Y., or —
Circle Inform-A-Gram No. C5.

Welding Stainless Tubular. A folder of interest and value to those who weld stainless tubular products has been published by the Tubular Products Div'n of The Babcock & Wilcox Co. This informative folder outlines the welding characteristics of both austenitic and ferritic grades of stainless steels and discusses the question of proper joint design. Various welding methods such as fusion, metallic-arc, oxyacetylene atomic-hydrogen, inert gas arc, and flashbutt welding, are briefly described in the booklet. A table of recommended arc welding procedures is included which suggests electrodes, preheating, and postwelding heat treatment. Copies of "Welding Stainless Croloy Tubing and Pipe", folder TCD 162, are available upon request to Tubular Products Div'n, Babcock & Wilcox, Beaver Falls, Pa.
Circle Inform-A-Gram No. C6.

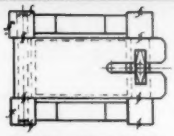
A Useful Booklet — "Cerro Alloys in Foundry and Pattern Shop" — illustrates and describes in 12 pages how Cerro de Pasco low-temperature-melting alloys are used to advantage in such shops. Contents include making master patterns for constructing aluminum matchplates, for anchoring patterns to matchplates, for making core box and dryer patterns, for metallizing wood patterns and core boxes, for salvaging worn core boxes, for altering and repairing matchplates, and for various other foundry and pattern shop tasks. This revision of an earlier edition is free. Send your request to Cerro de Pasco Corp., 40 Wall St., New York 5, or—
Circle Inform-A-Gram No. C7.

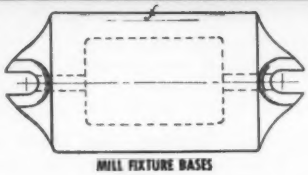
$AVE DOLLAR$
WITH NOBLE & STANTON
Standards
Save 2/3 the Cost of Custom Making!

Complete Line of Top Quality
JIG and FIXTURE COMPONENTS
Stocked for Quick Delivery from Dealers Coast-to-Coast

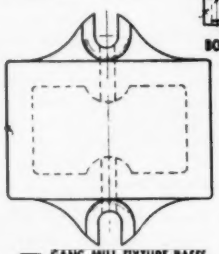
CUT Man-Hours—CUT Design Time—CUT Toolroom Costs

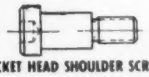
SPHERICAL WASHERS

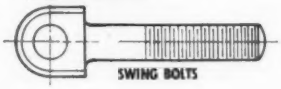

BOX JIGS—RECTANGULAR

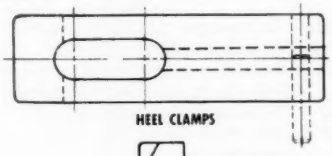

MILL FIXTURE BASES

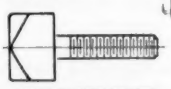
CAM LEVER


GANG MILL FIXTURE BASES


SOCKET HEAD SHOULDER SCREWS

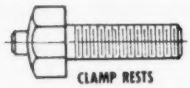

SWING BOLTS

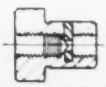

HEEL CLAMPS

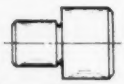

QUARTER TURN SCREWS

KNOB SHOE ASSEMBLIES

GROUND THREAD STUDS


CLAMP RESTS


SURE LOCK FIXTURE KEYS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ADJUSTING HEAD SCREWS

"C" WASHERS

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ADJUSTING HALF NUTS

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OVER 500 COMPONENTS AVAILABLE!

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- Double Cam Assemblies (9 sizes)
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- Flat Nose Heel Clamps (13 sizes —left Soft for your alteration.)
- Equalizing Assemblies
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- Jig Legs
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- Torque Screws
- Toggle Pads
- Locating Pins
- Ball Hand Knobs
- Double Cam Levers

Listed above are new additions to our line. The drawings show a few of our many widely accepted, fine quality Standards... which include Mill Fixture Bases, Box Jigs and our popular T-Angle Plates which are exclusive with Standard Parts Company.

Tracing sheets which save design time are available for every part. Get complete details and facts by writing for our 66-page Catalog.

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CIRCLE INFORM-A-GRAM KEY NO. 1001

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4	20	35	50	822	941	1101	1192	1243	1302	1354	1412	1471	1502	1525	
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10	26	41	791	841	1011	1151	1212	1264	1323	1391	1431	1485	1508	1542	
11	27	42	792	851	1021	1152	1221	1271	1331	1392	1441	1486	1511	1543	
12	28	43	793	861	1031	1153	1222	1272	1332	1393	1442	1487	1512	1544	
13	29	44	794	881	1041	1154	1223	1281	1333	1394	1443	1491	1513	1551	
14	30	45	801	891	1051	1161	1224	1282	1341	1401	1451	1492	1514	1552	
15	31	46	802	901	1061	1162	1231	1283	1342	1402	1461	1493	1521	1553	

EDITORIAL ITEMS

A1	A16	A31	A46	B6	B23	B39	C3
A2	A17	A32	A47	B9	B24	B39	C4
A3	A18	A33	A48	B10	B25	B40	C5
A4	A19	A34	A49	B11	B26	B41	C6
A5	A20	A35	A50	B12	B27	B42	C7
A6	A21	A36	A51	B13	B28	B43	D1
A7	A22	A37	A52	B14	B29	B44	D2
A8	A23	A38	A53	B15	B30	B45	D3
A9	A24	A39	B1	B16	B31	B46	D4
A10	A25	A40	B2	B17	B32	B47	D5
A11	A26	A41	B3	B18	B33	B48	D6
A12	A27	A42	B4	B19	B34	B49	D7
A13	A28	A43	B5	B20	B35	B50	
A14	A29	A44	B6	B21	B36	C1	
A15	A30	A45	B7	B22	B37	C2	

Which article in this issue was of most interest to you? _____

_____

THESE INFORM-A-GRAM CARDS are for the convenience of *TOOLING and PRODUCTION* readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured — all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the numbers of the items wanted. If there is no identifying number, use the page number.

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A8	A23	A38	A53	B15	B30	B45	D3
A9	A24	A39	B1	B16	B31	B46	D4
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a difficult piece to HARDEN . . .

. . . yet it gave no trouble

thanks to SAGAMORE DIE STEEL

Note the complex section of this small ratchet driven friction clutch. Yet, with non-deforming Sagamore Die Steel, there is no distortion or size variation in the intricate webbing.

After being machined from a 3" round bar of Ludlum Sagamore, the clutch was hardened from 1775 F. The piece was air cooled and then drawn at 600 F. The result, a Rockwell C hardness of 55/56.

Ludlum Sagamore is a relatively new type of non-deforming die steel which has had a rapid increase in popularity. It combines excellent non-deforming properties and unusual toughness with freedom from hardening hazards. Similar to high carbon-high chromium steels in behavior and applications, Sagamore has the added advantages of lower hardening temperatures, easier machining and grinding, greater toughness and lower costs.

There's an A-L tool steel to help solve your toughest tool steel problems. Call your nearest office or distributor today, or write *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania.*

Write for your
SAGAMORE BLUE SHEET

A concise 4-page booklet of facts on the handling and shop treatments of Sagamore. Included is complete information on forging, annealing, tempering, etc. and detailed laboratory data on physical characteristics. *Ask for your free copy.*

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WAD 5349

AL® FINE TOOL STEELS SINCE 1854

CIRCLE INFORM-A-GRAM KEY NO. 1011

. . . Month's Talk, from page 32

quicker, how they can be made cheaper, how they can be made more effective. Many important items of military equipment are in the same general categories as civilian equipment with which we have had a great deal of experience.

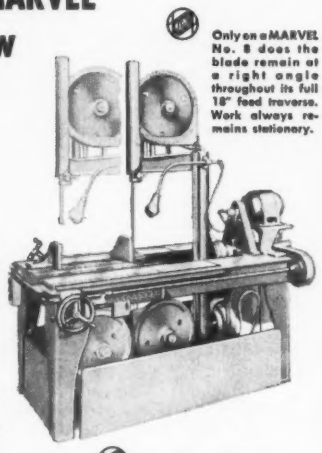
These, of course, are the broad purposes of the American OrdnanceAssociation, which, I am sure, can play an important role in perfecting our "war prevention program."

I am quite without experience in the ministerial field, but I am told that, to be effective, a sermon must be short and must be confined to making a single point, else on one hand, the congregation will become restless or, on the other hand, it will become confused.

I am about to conclude with the hope that you are not yet restless. The single point I want to get over to you tonight is that, despite the alarms and excursions which are reported in the news headlines almost every day, it is nevertheless a solid fact that we can and will prevent another general war simply by keeping a high risk for our opponent present in war and, in doing this, you and I can play our part.

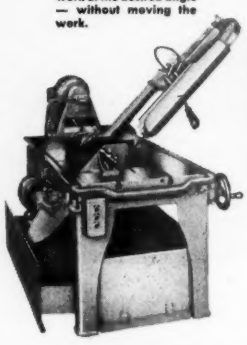
Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal



Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.

Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a ½" rod or cut-off an 18" x 18" cross section.

Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams

Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL Metal Cutting SAWS

Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1021

COOLANT FEED MANIFOLD HAS OFF-ON CONTROL

A new coolant feed manifold constitutes an "engineered system" for applying coolant to multiple drilling operations. It eliminates mess, provides better coolant application for longer tool life, and saves time by ending constant, troublesome nozzle adjustments.

Photo courtesy Graymills Corp.

The manifold can be easily and quickly mounted on most standard 4 or 8-drill heads, since the split ring design makes it unnecessary to remove the drill head for installation. Coolant is directed to the point of the drill where it does the most good.

Eight removable, adjustable nozzles are supplied with the manifold, but it is so designed that it can accommodate up to 16 nozzles if desired. Nozzles can be removed in 15 seconds; and, as they are made of standard copper tubing available everywhere, replacements can be made economically and without special tools.

As the drill head moves up, the nozzles move out of the way and coolant stops flowing. Operator does not get drenched. As the head comes down and drilling starts, the coolant flows instantly and automatically.

AN EVALUATION OF FIVE WAYS TO BUY MACHINERY

by Sydney D. Maddock
President,
C. I. T. CORPORATION

THE LACK OF READY CASH should not deter any company from buying the machinery and equipment it needs to decrease costs and increase profits.

The need is acute in many, if not most, plants today for replacement of old machinery which has outlived its usefulness and is nibbling away profits with slow production and excessive maintenance costs.

Fortunately, any sound concern interested in increasing production and decreasing operating costs can install modern, labor-saving machinery and equipment without weakening its working capital position.

Very few companies, of course, are able to draw too freely on operating funds for capital investments, so the practical answer to the problem of financing equipment is to use outside capital which can be repaid over a period of time. The proper purchasing program will make it feasible to retire the cost of the new equipment largely out of increased earning capacity.

Usually there are five ways the management of a business or industry may buy the machinery it needs. (1) It may pay cash, (2) it can get a short-term bank loan, (3) it can make capital issues, (4) it can get limited credit from the machinery manufacturers, or (5) it can use a term-loan from an industrial financing company.

If a company has available cash reserves, it could buy the new machinery for cash. However, before converting cash into fixed assets of machinery and equipment, it might be well to make certain that such a move will not so curtail working funds that the company must forego favorable cash purchases of inventory or lose cash discounts on current bills.

As to short-term borrowing, a line of bank credit is usually most valuable for current loans on short terms, normally of 90 to 120 days. To borrow money for the purchase of machinery is to borrow for acquisition of capital assets, and such loans are not the ordinary function of a commercial bank, which should not be asked to, and usually will not, freeze funds for a long period. Another disadvantage, of course, is that the borrower impairs his open line of credit, which should be kept for current, seasonal and unforeseen requirements.

Just as short-term bank loans have a definite place in the financing of industry, so are there certain advantages and disadvantages in the financing of capital investment, whether by bonds, debentures, preferred or common stock. Such issues are used primarily where the need is for large amounts of financing. The smaller the amount involved the higher the coupon or dividend rate will be, and the larger the underwriting commissions and expenses will be in proportion to the money obtained.

Machinery manufacturers should not be asked to act as bankers. Their terms must be

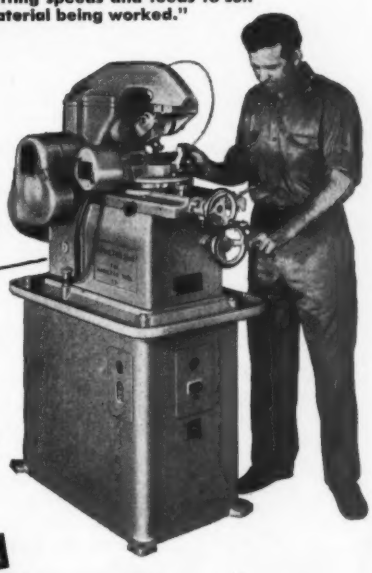
. . . *Continued on page 104*

5409

SHORT RUNS of PRECISION GEARS

Short runs of small, fine pitch, precision gears (gears up to 6" O.D. of the gear blank) carry high unit costs largely because of the top-heavy machine set-up time as compared to total production time. You can beat the machine set-up problem by routing small precision gear jobs to Hamilton Precision Gear Hobbers . . . for:

"Hamilton Precision Gear Hobbers feature independent selection of speed, feed, and indexing; reducing machine set-up time and offering a selection of cutting speeds and feeds to suit (exactly) the material being worked."



if you buy small quantities of precision gears, tell the man to "put your job on a Hamilton." You stand to profit two ways!

WANT FACTS?

Write for Hamilton Bulletin No. 5409.
Address: The Hamilton Tool Company,
832 South Ninth Street,
Hamilton, Ohio

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY No. 1031

. . . Evaluation, from page 103

fitted to their own needs rather than to the buyer's. And when purchases are made from several machinery makers, the buyer then must make payments to each separately, probably under different terms for each purchase.

Machinery makers generally prefer to leave financing to financing institutions. Few have adequate facilities to carry large amounts of installment paper. Among the larger firms, obtaining the money which otherwise would be tied up in installment contracts is not the most important factor in turning to outside financing agencies. The machinery manufacturers' primary need is for an experienced credit checking and collection service which can be relied upon to get results while maintaining customer goodwill. Few care to carry paper themselves.

The fifth financing plan, and the one devised to fill the gaps in other methods, is an equipment funding program such as those offered by the larger and more experienced industrial financing companies.

The procedure is very simple. When the buyer is ready to negotiate with the seller, he supplies the financing firm with the details of the contemplated purchase, together with the customary financial data. When the financing agency says it is prepared to finance the machinery purchases, the buyer makes his downpayment to the seller and executes documents provided by the finance company. The financing agency provides funds for the balance due on the equipment and the buyer subsequently makes his payments to the financing firm each month.

The cost of this financing naturally varies with the size and standing of the borrower, the type of equipment involved, the size of the transaction and the term of the obligation.

Such programs are particularly valuable when purchases are to be made from several different sources. The buyer is able to treat them all as one obligation with the industrial financing firm.

These plans also answer the need for a satisfactory source of intermediate credit. Security underwriters will take care of the large borrower, as, of course, will the larger finance companies. But the industrial financing company is becoming an increasingly popular source for machinery financing which requires sums of up to $1,000,000 or $2,000,000. Such plans also can be suited to the exact needs of each individual user. They are appropriate to the purchasing of any income-producing equipment and interfere in no way with management.

SERVING "INDUSTRY" FOR OVER 30 YEARS
RELY ON Morton
MANUFACTURERS OF HIGH QUALITY
FIXTURE CLAMPS AND COMPONENTS
MORTON'S products are built for STAR performance.
MORTON saves you time, labor, tool and design costs.
SAVE by using them as STANDARDS. There's a size and type to fit your most rigid requirements.
Highest quality of workmanship and materials maintained.
IMMEDIATE DELIVERY on Standards . . . Standards can be modified to suit your application.
Your Tool Stores should have a representative stock of all MORTON'S details. Individual parts or complete assemblies.
Illustrative Catalog containing full size templates of each product for tracing into your design.
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MORTON MACHINE WORKS
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CIRCLE INFORM-A-GRAM KEY No. 1041

EDITORS NOTE NEW MULTI-V BELT BOOK

A 76-page, well illustrated multi-V belt engineering handbook, published by one of the leading belt manufacturers and featuring a convenient guide to the design of standard and high capacity drives, was recently called to the attention of the TOOLING & PRODUCTION editors. It is by far the most valuable literature on this subject.

Included in the handbook are new horsepower rating tables

which closely approximate actual operating conditions and reflect the increased ability of modern belts. These tables permit the design or re-design of V belt drives at lower cost by reducing the number of belts needed to carry a given load and indicating the possible use of lower cost sheaves.

A series of 22 simplified, easy-to-read tables cover such aspects of V belt engineering as installation and takeup allowance, belt speeds, length correction factor, calculation of center distance, and a geometry chart for drives.

Automatic Pellet Deflashing Cuts Cost Of Plastics

Can a single machine replace 40 girls and save $100,000 a year in deflashing casts in the manufacture of plastic parts? Such was the case at one plastic molding plant, and is typical of the savings available from the automatic pellet deflashing process.

Photo courtesy of American Wheelabrator and Equipment Co.

Tumblast for performing automatic pellet deflashing. One company was able to deflash 12,000 pieces per day by conventional manual finishing methods. By pellet deflashing, they now take only 24 minutes to do the same work that formerly required one day.

Hundreds or even thousands of the plastic moldings are put into cabinet-type machines, the most common of which utilizes the tumbling principle in conjunction with blasts of nonabrading pellets thrown at high velocity upon the moldings. The pellets are made of such materials as crushed apricot pits or crushed nut shells, or a mixture of the two, and they are hurled upon the work by centrifugal force from a rotating bladed wheel in the roof of the machine.

Individual handling of the pieces is therefore eliminated. In spite of the great number of parts deflashed at a single time, every surface of every piece is completely exposed to the deflashing action of the pellets, by the tumbling action. The blast can penetrate holes and cored areas to eliminate the need for either prior or subsequent punching, drilling, or broaching solely to remove flash.

This process is adaptable for thermosetting molded plastics having a flash or burr brittle enough to be snapped off under a mechanical force. It has also been highly successful in the deburring and defuzzing of laminated stampings.

The advantage of soft grit pellets is that they can be easily propelled with enough energy to snap off the flash, but they do not possess enough energy to scratch, nick, or break the parts, themselves.

EACH MACHINIST BECOMES A 5346

ONE MAN CREW

WITH PORTELVATOR®

THE HANDY HAMILTON PORTABLE ELEVATING TABLE

One man can lift, lower, and transport compact, heavy loads which, without Portelvator, would require the combined strength of three or more men.

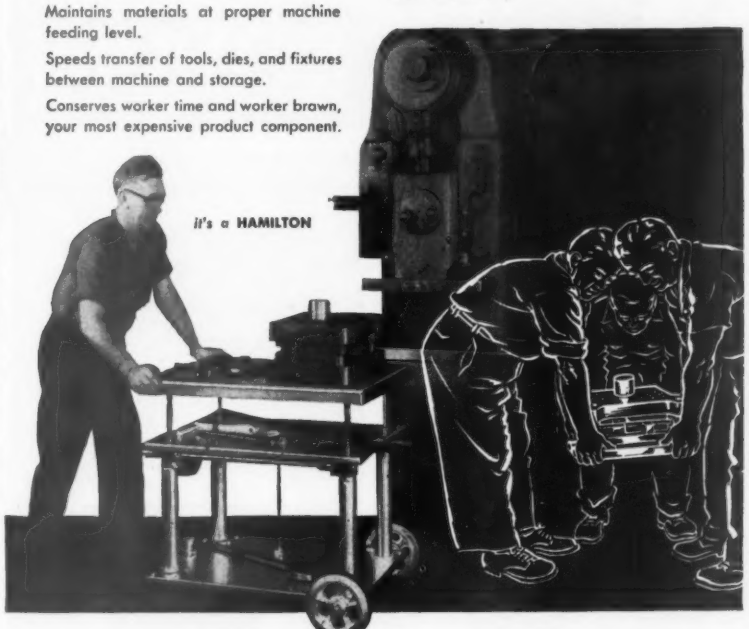
Maintains materials at proper machine feeding level.

Speeds transfer of tools, dies, and fixtures between machine and storage.

Conserves worker time and worker brawn, your most expensive product component.

Reduces injuries to workmen, and damage to tools and materials due to manual handling.

Provides a portable work bench when and where required.



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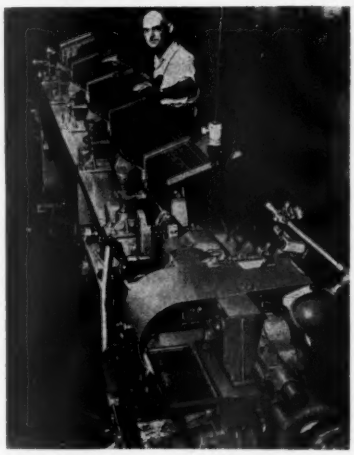
CIRCLE INFORM-A-GRAM KEY No. 1051

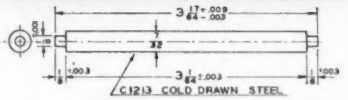
PNEUMATICALLY POWERED MAGAZINE BAR FEED

Production of voting machine door-hinge rods was increased by the methods engineers at Automatic Voting Machine Co., Jamestown, New York, by discarding the use of manual feed fingers in favor of an automatic magazine loading pneumatic bar feed.

The rods formerly were formed and cut on a No. 00 Brown & Sharpe automatic screw machine to 3 17/64″ lengths, which had to be held to plus 0.009″, minus 0.003″ tolerances. C1213 steel rods, 7/32″ OD and in lengths of either 10— or 12—feet, were fed manually through feed fingers to the spindle and collet of the automatic screw machine.

To increase production, AVM engineers first cut the cycle time of the automatic screw machine to 4½ seconds by devising a cutting tool that formed two shoulder trunnions simultaneously at each end of the piece, while the piece was supported at one end by the turret stop.





Photos courtesy Lipe-Rollway Corp.

Nevertheless, the manual feed method still presented a number of problems. Since the door-hinge rods are rather long parts, a steel rod would feed through the Brown & Sharpe machine in approximately three minutes time. To keep the machine stocked, the operator had to be present at the end of each three minute interval, ready to reload the automatic screw machine. If for any reason he could not, the machine ran idle. Considering the fact that the operator also was responsible for other machines in his bay, and had to set up, feed and maintain them as well as the No. 00 Brown & Sharpe, the opportunities for continually keeping his battery of machines stocked were limited by the attention demanded of him by his other duties — setups, tooling, inspection, and minor repairs.

Besides scratching stock, feed fingers were either too tight or too loose. When loose, the bore of the feed finger would not hold the pins to proper length. When tight, they marred the surface of the stock. The rate at which feed fingers were replaced, as a result, was high.

To overcome these disadvantages, the same automatic screw machine was equipped with a Lipe-Rollway magazine bar feed. This particular bar feed is actuated by air valves and cylinders.

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CIRCLE INFORM-A-GRAM KEY No. 1061

Approximately one-hundred steel rods are racked in a magazine along one side of a split stock bar tube, the lower half of which slides backward to receive the bottom rod in the magazine. A stock pusher, inside this tube, moves the bar into the spindle and collet of the automatic screw machine. After the rod has been almost entirely fed through the automatic screw machine, its end remnant is ejected automatically by a new rod.

The exact sequence of the feed cycle after the rod in the machine collet has been machined up to the end remnant is as follows: the machine clutch disengages, stopping the tool cycle but allowing the spindle to revolve, the collet to remain open, and the bar feed stock pusher to retract. The bar feed cam actuates an air valve which automatically trips the bar feed magazine, so that only one rod at a time drops into the lower, open half of the stock bar tube. The stock pusher then feeds the new rod through the automatic screw machine and ejects the end remnant. Positioned for the first cut-off operation the new rod — actually the stock rod pusher — engages the automatic screw machine clutch, the collet grips the stock rod, and the machine again is in full cycle operation.

After the change-over from manual to pneumatically-activated feeding of the steel rods, production of door-hinge rods on the Lipe-equipped No. 00 Brown & Sharpe increased 170%. This figure largely expresses the efficiency that was gained by eliminating completely the need for frequent loadings by hand. Since the Lipe-equipped automatic screw machine forms and cuts door-hinge rods from rod stock without interruption for periods up to several hours, it offers the advantage of freeing its operator to devote more attention to maintenance and operation of other machines in his bay.

Conveyor Drive

Locating a self-contained power unit at a point on a roll or conveyor where the power is required, makes possible the elimination of long lines of shafting, open gearing, complicated gear motor drives requiring special base plates, and couplings.

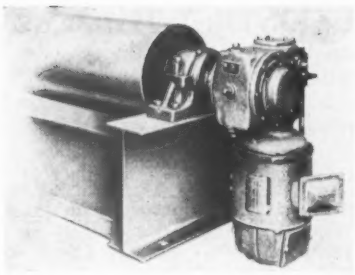

Photo courtesy Philadelphia Gear Works.

The Floating GearMotor reduces power transmission to its simplest terms. This compact unit mounts directly on the driven shaft. Since the power unit becomes an integral part of the driven shaft, there can be no misalignment between the power unit and the driven shaft.

This power unit can be mounted in almost any location or position due to its compact design. The right angle worm and worm gear arrangement permits the entire unit to nestle close to the driven machine. Gearing is liberally proportioned for 300% peak loading over normal ratings.

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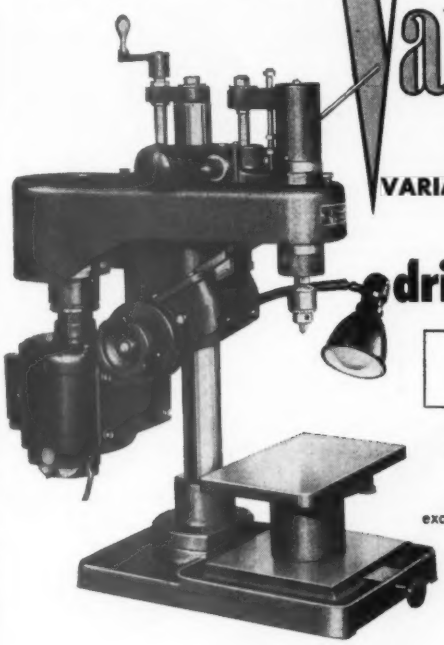
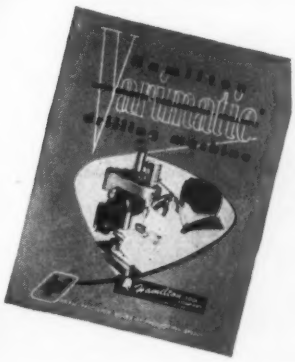


to drill holes (.004" to 5/16") in all drillable materials, to the most exacting specifications and on the most relentless production schedules.



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CIRCLE INFORM-A-GRAM KEY No. 1071

LABOR COST CONTROL BY MANNING TABLES

by M. K. Sheppard
Management Consultant
M. K. SHEPPARD & CO.
Cleveland, Ohio

SINCE THE OUTBREAK of World War II, American Industry has had little opportunity to concern itself with the regulation of the size of payrolls to the volume of production. Most business forecasters and economists predict continuing high industrial activity but also predict for most industries an adjustment period of "peaks and valleys" of activity in the months ahead. These times of changes are times of opportunity for those who seize the initiative and keep their organization alert and trim at all times.

The hourly labor payroll in a manufacturing company today is an important factor in the cost of production and should be regulated more quickly than heretofore.

Since the payroll of every company is made up of people and personalities it is often difficult to adjust rapidly enough to the actual needs of the business both for the increase and decrease of production. Still every executive is faced from time to time with the problem of determining how many people each of his subordinates should employ to carry on the essential functions of the business and still maintain a competitive position in his industry by supplying the customers with services and products at fair prices.

Today, well run manufacturing plants maintain detailed standards of each production operation and carefully estimated budget standards for precise control of labor and burden expense. These standard cost control procedures set up by cost centers, departments, divisions and by plants are too intricate, complex and detailed to provide managers with a quick guide for adding or releasing workers to meet sudden increases or decreases in production volume such as we have experienced in the last few years and most likely will experience in a greater degree in the immediate future.

Managers are looking for a sound, quick and effective index for regulating in advance the number of men on their payroll when projected sales volume is expected to change 10%, 20% or even 30% in either direction in the future.

A simple common sense tool that answers the management problem is a Manning Table for every department in the plant or company.

A Manning Table is a preplanned and agreed upon number of people for each job classification in each department of the company for any volume of business. Manning Tables provide every level of supervision with a predetermined table of the right number of productive, non-productive, service, staff and administrative people for any given volume of sales and production, enabling department supervision to preplan their working force as soon as general management,

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CIRCLE INFORM-A-GRAM KEY No. 1081

sales or production planning gives them a schedule of expected monthly or quarterly production.

We can expect direct labor workers to meet their standard of production if they are provided with sufficient amounts of the right kind of material, tools, equipment and instruction.

In a well regulated plant the changes in schedule are followed by changes in flow of materials to the workers. Unless the number of workers required for the amount of work to be done is regulated and planned in advance — idle time due to lack of materials or scheduled production is bound to occur.

To prevent this worker idleness a simple easy-to-use formula that the foreman, superintendent and management staff can quickly compile is necessary.

How to Install Manning Tables for Direct Labor

It is assumed that almost every company uses some form of operation routing sheets listing the number of standard manhours for each operation on each machine for each product it manufactures. It is also assumed that reasonably firm schedules of production for the next week or month are regularly supplied by someone responsible for the scheduling. Using these two basic sources of information, we can develop quick reference Manning Tables.

This computation is usually done as follows: From the operation routing sheet find the total standard manhours for operations for each product for each productive department. From these totals develop a card file of Tables showing the number of manhours required per unit or per hundred units of production for each product in each department.

List the scheduled monthly and daily production of each product, multiply the required number of manhours per unit of production to get the number of manhours per day for each product. The total number of manhours required for each product added together shows the total number of direct labor manhours per day required by each department to produce scheduled production. The total required manhours per day divided by the hours in one shift gives the number of direct labor people required per day. This computation is made by the production planning department or by the foreman or a clerk each time a new or changed production schedule is issued.

If a monthly schedule is issued it should be available early enough to provide the foreman of each department with his direct labor requirements before the first day of the period so that he can arrange to place the right number of men at the proper benches or machines.

With this Manning Table the foreman is free to man his department as he chooses with operators for various machines working on those shifts that are in his judgment best suited for the products to be made.

How to Install Manning Tables for Indirect Labor

The first step is to obtain a list of positions and number of persons in each indirect labor posi-

. . . *Continued on page 110*

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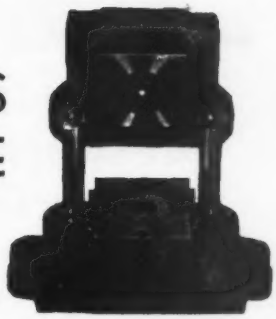

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CIRCLE INFORM-A-GRAM KEY No. 1091

. . . Manning Tables, from page 109

tion at the present volume of production in each one of the departments. Each department head is then asked to submit his ideas as to how many people in each one of these positions he would require to operate his department on a two shift basis and also for economical operation on a one shift basis. Whenever possible check back into the past employment records or departmental force reports to compare the number of people on the payroll at given volumes with the number suggested by the department heads.

Next, as a check on the previous payroll figures for different volumes of business, analyze the profit record of each period and determine what adjustment would be necessary in the total actual direct and indirect payroll figures in past periods to bring about a satisfactory profit result.

The third step is to list the positions in each department that are essential regardless of volume of business. These include the salaried department head, his assistant and probably a clerk. These are considered the **fixed** positions in the department. Also list all other positions that should be increased and decreased with the volume of work in the department. These are the **variable** positions.

The total variable manhours on each indirect labor position at normal rate of operation, either two shift or single shift, divided by the total standard direct labor hours for the same level of operation gives the variable rate for each indirect position.

With these tables established the foreman can be given or can compile his own Manning Table whenever a new production schedule is issued in the following manner:

(1) Compute and add together the total direct labor manhours required for each scheduled product for a calendar period.

(2) Divide the total direct labor manhours by the hours in one shift for the calendar period. This gives the total number of men required.

(3) Allocate the direct labor men required to the particular machines needed for scheduled production.

(4) For indirect labor list the people required in fixed positions.

(5) Multiply the total standard direct hours by the indirect labor variable rate to get the manhours of indirect labor on each position.

(6) Divide by shift hours to find the indirect labor people on each position.

(7) This results in a table showing the number of persons required in each fixed and variable position in each productive, service or staff department in the entire plant or company.

The following are a few examples of how Manning Tables have been used successfully:

Example No. 1: By using a combination of daily budget control, and weekly Manning Tables in the weld shop of a small fork lift truck manufacturer, the production output remained practically constant for a period of five months, while the over-all efficiency was increased 30%. For this same period of time, the number of men utilized in this department progressively decreased from 72 men at the be-

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ginning of the five month period, to 51 men at the end.

Example No. 2: A thorough analysis was conducted of all operations in one works of one of the world's largest steel companies where a comprehensive daily budget control of departmental costs was installed. Both industrial engineers and industrial accountants worked closely together to bring about improved operating performances over a period of a year. Some departments had improved slightly, some not at all and some had lost ground. The effect of low operating performances on actual costs of making steel was vividly recognized by the top plant management. In order to put increased interest and enthusiasm into the program and present it more vividly to each responsible department head, the man hour controls were expressed in the **number of men** required for a given schedule and these Manning Tables were compared weekly with the actual number of men on the payroll in each department. The general superintendent and his assistant conducted an active cost cutting campaign through manpower control discussing excess labor with each superintendent, general foreman and foreman.

In January the excess number of men in the entire plant was over 1,000 per month while the rate of production was 75% of capacity. In February the excess was 910 and the rate of production volume 55% of capacity. In March, excess manpower was 500, production 50% of capacity. In April, the extra labor force had dropped to 117 while production volume remained at 50% of capacity.

This is an example of labor control through close follow up by all levels of management.

In conclusion a properly set-up and maintained Manning Table offers the solution to the following problems of management in periods of decline or rise in production volume:

(1) When volume falls, management tends to think it will be temporary, and usually waits too long before cutting manpower (or expense). A Manning Table automatically shows what cuts in manpower are necessary to meet scheduled needs. Without pre-preparation the making of a study of Manning requirements wastes too much time and money before requirements are properly determined.

(2) Without the existence of proper Manning Tables department heads seldom make a move to cut manpower needs until firmly told to do so by superiors. Furthermore, non-productive, service and staff or administrative department heads tend to over-estimate the importance of their own departments and think the other fellow should cut back but not they. These department heads often think they should keep **their own** manpower at the usual level even when business volume drops 20%, 30% or 40%.

(3) A Manning Table provides management with a working tool for cutting manpower wisely but immediately in periods of declining volume and gives management a working yardstick for adding people in periods of rising volume or when the need for manpower changes due to new activities.

A SHARP POINT EVERYTIME!

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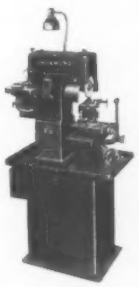

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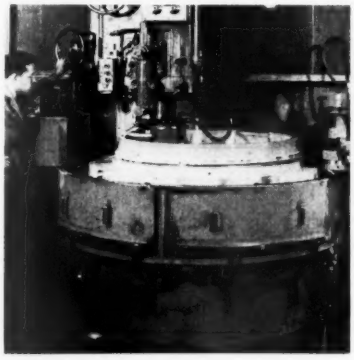
CIRCLE INFORM-A-GRAM KEY No. 1111

HERE IS AN INCENTIVE SYSTEM THAT SAFEGUARDS QUALITY

Machine operators employed in the grinding of large expensive bearing races made from forgings, were overly cautious for fear of scrapping the piece being ground. Grinding of such pieces, some of which are 72" in diameter, was consequently slow and costly. On the other hand, it would be ridiculous to demand high speed grinding of these pieces, for if even one were lost, the loss involved would be considerable.

The problem was to establish an optimum grinding speed, and then an incentive system which would encourage the operators to work at that speed. Conversely it was desirable to discourage working speeds which were either in excess or less than the optimum. In other words, an incentive system that would prescribe, within narrow limits, a safe yet profitable standard.

These forged, machined and heat treated bearing races are, by the time they reach The Timken Roller Bearing Company's industrial bearing grinding department, worth up to $1500 each. The grinding operators, keenly aware of the value of these parts, were formerly over-cautious. Production was consequently less than it should



have been. Furthermore, there had been insufficient incentive to encourage the grinding machine operator to use time to the best advantage.

Step number one in the solution of this problem was to establish a grinding practice that was safe, one that would not cause the case hardened surface of the bearing race to be damaged. This was accomplished by measuring the pull or resistance placed on the motor of the grinding machine at the various grinding speeds. When the infeed or rate of stock removal was increased or diminished, the variation in load on the motor was shown on an electrical measuring instrument.

The best grinding practice, with an ample safety margin, was accomplished when the resistance of the grinding wheel against the bearing race resulted in a pull, of a predetermined value, on the grinding machine motor.

It was next necessary to determine the time required to remove a given amount of stock at this grinding speed. A careful

. . . Continued on page 114

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CIRCLE INFORM-A-GRAM KEY No. 1121

CONSERVATION OF MENTAL RESOURCES

American industry faces a monumental task in its efforts to combat the waste of mental resources of its working men and women. Although only a small portion of America's population has had the advantage of higher education, fully half of the population is comparably capable of assuming positions, responsibility and leadership.

Dr. Eleroy L. Stromberg, manager of training and personnel research for The B. F. Goodrich Company, Akron, O., terms this waste an appalling misuse of "brain power." Speaking before delegates at the opening session of the Ohio State Safety Conference in Cleveland recently, Dr. Stromberg said that "the failure to train those who are mentally capable to assume responsibility for management, inventiveness, leadership and science, is certainly a waste of brain power."

The noted industrial psychologist theorized that one of the underlying reasons might be that it has not been financially attractive for young men and women to invest 4 to 6 years of their lives in the hopes of achieving one of the limited number of adequately paying white collar management positions. "It is logical to assume then," he said, "that most industrial organizations have upon their rolls individuals with tremendous mental reserves which have never been tapped because of a pre-determined policy pointing to a college diploma as a prerequisite for creative thinking and problem solving.

"It is certain that among the men and women who constitute industry's physical manpower resources, there are many who, if given the opportunity, could demonstrate that they are able to carry out many assignments now classified as jobs for college graduates. This waste of brain power is one of the great detriments from which industrial management needs to free itself.

Dr. Stromberg, formerly chairman of the psychology department at Western Reserve University, Cleveland, explained that he was not in any way arguing against university education. He made it plain, rather, that in his opinion, industry has not utilized the educational background of many of its people because many college-trained people are still burdened with tasks which could be just as adequately performed by those who have college ability but are without a college education.

He warned that another factor contributing to loss of brain power was the systematic approach to industrial jobs wherein the principle of fractionation and simplification has been used to the point where some industrial jobs become nothing more than automation reactions.

The B. F. Goodrich psychologist recommended that industry take steps to better utilize the mental abilities of its men and women who have not been fortunate enough to graduate from college. One way to do this would be to reexamine the requirements of the man who has a certain job. It may turn out that this man, and countless others like him, requires more of a challenging job to keep him happy and productive.

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CIRCLE INFORM-A-GRAM KEY No. 1141

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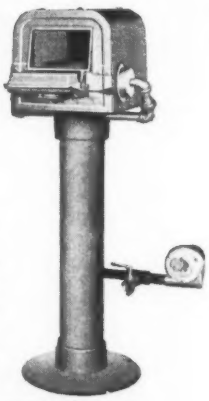

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. . . Incentive System, from page 112

time study of the operation determined the total time required to finish a given surface.

Each bearing part that now comes to the operator's machine carries with it a card specifying the grinding time necessary to properly finish the part. If the operator grinds the bearing part within a prescribed range of the time indicated, he receives maximum incentive pay. If the grinding time is less than or exceeds the prescribed time range, the maximum incentive rate is not paid.

Actual grinding time is recorded on a Chronolog attached to the grinding machine. When the grinding operation starts, a floor time keeper dials the Chronolog. This instrument also records the downtime due to lack of stock, absence of operator, changing pieces, personal reasons, minor adjustments, changing of grinding wheels, and machine repair. The performance of each operator and each machine is thus accurately recorded.

Results of this incentive system, since its inception at The Timken Roller Bearing Company, have been decidedly satisfactory. Extreme hesitancy, overcaution on the part of the operators, and fear of damaging valuable bearing races have been replaced by confidence. Production, as a result, has substantially increased. What was formerly accomplished only by years of experience, skill and judgement, is now being accomplished by accurate measurement. With the increased production has also come a commensurate increase in the operator's pay.

Timken Company engineers are convinced that maximum production is now being achieved without jeopardizing the quality of these bearing races. That care and quality has not in any way been sacrificed for a material increase in quantity is evident in the fact that not one bearing part has been lost to the scrap pile as a result of the grinding operation since the new incentive system was inaugurated April 27, 1953.

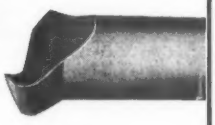
BUY U. S. SAVINGS BONDS

✓✓✓ Check these 3 Comet 'TIPS' for Precision Boring, Facing and Internal Threading

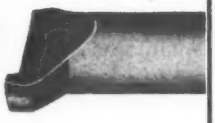
MADE OF HIGH SPEED or CARBIDE
FOR HOLES FROM 1/16" UPWARD
17 DIFFERENT SIZES

✓ BORING TOOL
- FAST PERFORMANCE
- ECONOMY IN PRODUCTION
- EFFICIENT IN RESULTS

Cutting Edges are lapped for better "Bores" and faster Feeds.



✓ FACING TOOL
- CONSTANT CLEARANCE
- CONSTANT SHAPE OF CROSS SECTION
- EASY RESHARPENING
- CONVENIENT TO USE
- LONG LIFE



✓ INTERNAL THREADING TOOL
- CONSTANT SHAPE AND CLEARANCE
- EASY RESHARPENING
- CONVENIENT TO USE - LONG LIFE

Dealers! Here's a Profit-Maker!

Write For Complete Data

COMET Tool Co.

738-T Broadway
New York 3, New York

CIRCLE INFORM-A-GRAM KEY No. 1151

SURE WISH I'D 'A' GOT ACE DRILL BUSHINGS

MORAL: FOR BETTER BUSHINGS- *Always Specify ACE!*

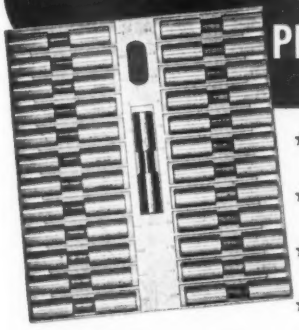
LARGEST *DELIVERABLE* STOCKS ANYWHERE

ACE

ACE DRILL BUSHING CO., INC.
5407 Fountain Ave., Los Angeles 29, Calif.

CIRCLE INFORM-A-GRAM KEY No. 1152

CLOSER TOLERANCES with DELTRONIC TENTH PLUG GAUGES



★ Size variation by ten thousandths
★ Set of 25 costs approximately same as Go and No-Go gauge.
★ Available in increments of 1/64" from 1/8" to 1"
★ Hardness is Rockwell C62/C64

This new system of precision gauging provides one gauge of nominal size plus 12 gauges of increasingly larger sizes in .0001" increments and 12 gauges of decreasingly smaller sizes in increments of .0001". Each gauge is identified. It is the same size on both ends to double the life in usage.

For further information write Dept. D1.

DELTRONIC CORPORATION
9010 BELLANCA AVENUE • LOS ANGELES 45, CALIF.

CIRCLE INFORM-A-GRAM KEY No. 1153

NOTE THESE FEATURES

QUALIFIED CENTER LAPPING MACHINE is the ONLY Center Lapping Machine with the Following Features:

1. Spring cushion tailstock prevents lapping stone breaking, loading or burning.
2. Positive dressing form from lifetime cam.
3. Fingertip dresser infeed. Fast dressing. Dresser can be held against cam and diamond infeed made simultaneously.
4. Same arm motion used for dressing and lapping.
5. Easy and fast dressing makes grinding stone last much longer. Remember, only a clean dressed stone will cut fast, clean and accurately.
6. Speedy adjustment for varied length jobs; positive location of tailstock at all times.
7. Change of lapping stone is very simple and fast.
8. The most rapid and accurate center lapping machine on the market today.

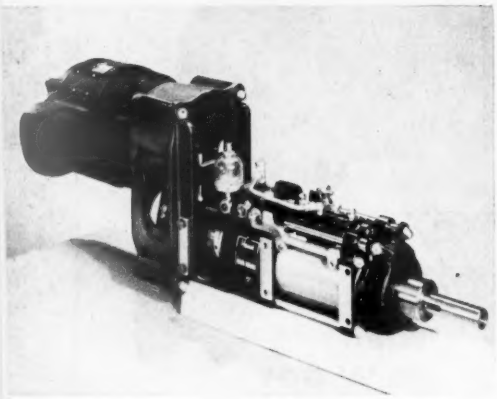
Quotation on Request.

QUALIFIED GAGE COMPANY
4080 W. Eleven Mile Road Berkley, Michigan

CIRCLE INFORM-A-GRAM KEY No. 1154

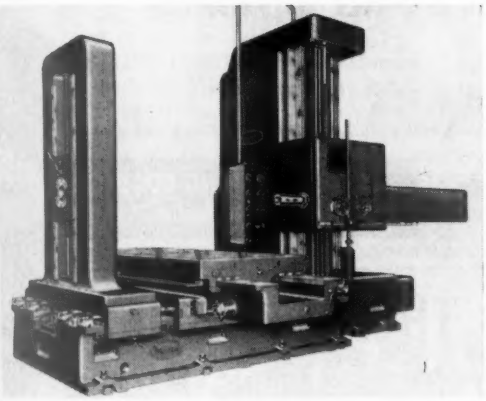
PROGRESS

NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS



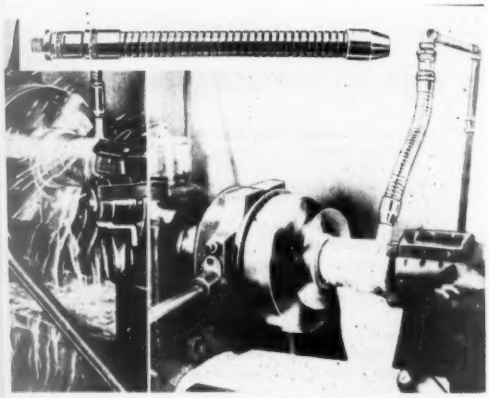
DRILL UNIT . . .

Speeds from 300 rpm to 10,000 rpm can be established on the Model 34 Holomatic (air-hydraulic) drilling unit by Hause Engineering, Montpelier, Ohio. It takes work loads of up to 200 lb-in of torque in drilling, reaming, chamfering, etc. The stroke is adjustable to 4" and depth accuracies to 0.005" can be maintained.
Inform-A-Gram No. A1.



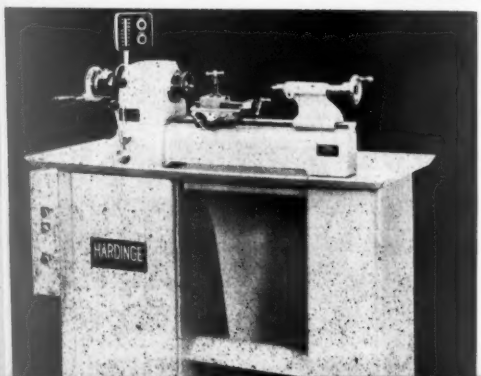
HORIZONTAL BORING

Foremost in improvements made by Bullard on the Universal Horizontal Boring machine is the 4-Way Bed which provides more rigid support for the more heavily constructed table, permitting heavier work loads with a higher degree of accuracy. The Bullard Co., Bridgeport 2, Conn.
Inform-A-Gram No. A2.



COOLANT AERATOR

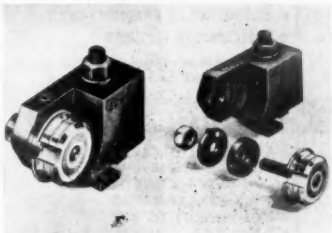
The Mel-O-Flo coolant aerator connects directly to the coolant line and mixes atmospheric air with coolant resulting in a non-splash aerated mixture that clings to work and tools and reduces centrifugal throw-off. This keeps operators and floors dry and eliminates waste and hazards. Melard Manufacturing Corp., 432 Austin Pl., New York.
Inform-A-Gram No. A3.



PUSH BUTTON LATHE

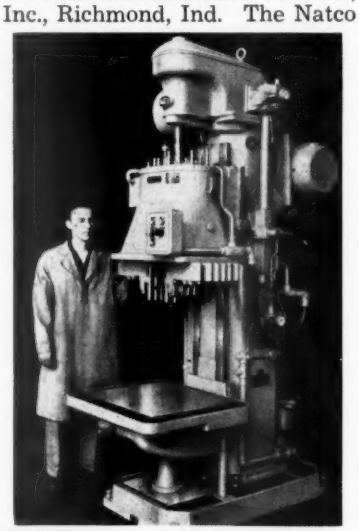
Instantly variable spindle speeds are achieved by push button control on the Hardinge DV59 high speed precision lathe pictured. Hardinge Brothers, Inc., Elmira, N. Y.
Inform-A-Gram No. A4.

The "Adaptool-post" enables the user to employ smaller less costly circular form tools on larger automatic screw machines. For example, with this adaptable cross-slide tool post, tools for No. 00 machines may be used on No. 0 or No. 2 and No. 0 tools on No.



2 machines. A special screw adjustment provides positive and accurate setting of the cutting edge, at the same time permitting greater clearance. Provision is made for squaring the tool with the work. The "Adaptool-post" is a product of The American Cam Co., Hartford 1, Conn.
Circle Inform-A-Gram No. A5.

A High Speed, Push Button controlled multi-drilling and tapping machine for medium sized work is being manufactured by the National Automatic Tool Co., Inc., Richmond, Ind. The Natco

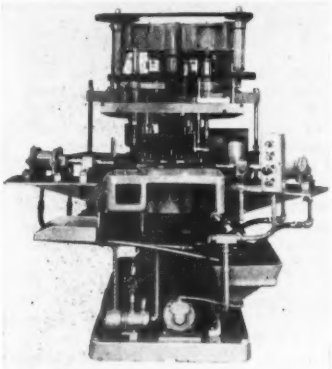


D225H is available with single spindle head, adjustable spindle head, or fixed center spindle head, making possible the multiple drilling or tapping of small holes with a minimum of cost.
Circle Inform-A-Gram No. A6.

ON PARADE

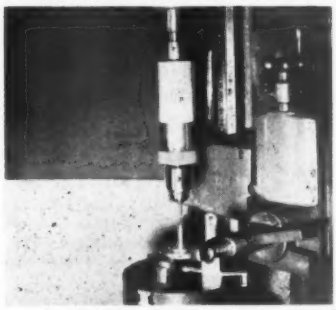
Mail FREE Inform-A-Gram Card for MORE Details.

The Flexibility of Bodine's basic machine design pays off in short run automatic mass processing. Shown here is Bodine standard Model 41-20 tooled up to process 3 different parts having 22 variations in size and hole positions. The use of a horizontal and vertical milling spindle permits a light milling operation to be combined with drilling and tapping. Bodine Corp., 319 Mountain Grove Ave., Bridgeport, Conn.



Circle Inform-A-Gram No. A7.

"Thread-Quill" makes it possible to control the forward travel of the drill, tap, or die and "feel" any delay in the cutting action when working on small precision threads. A pressure release allows the tool and sleeve to spin with the workpiece. When bed turrets on screw machines or turret lathes fail to locate in the same position, Thread-Quill and its floating action compensates for misalignment. Thread-Quill is supplied with a chuck and three button die adaptors (⅝", 13/16", and 1"). D.S.C. Machine Co., 29 Bertel Rd., Mt. Vernon, N. Y., or —

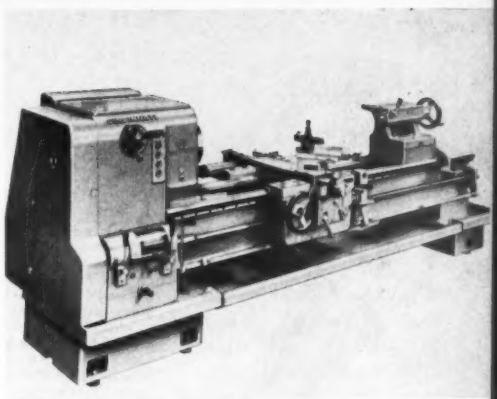


Circle Inform-A-Gram No. A8.

"TRAY-TOP" LATHES

All-geared-head lathes, swinging 21½" and 26" join the Cincinnati Lathe & Tool family of "tray-tops." The new lathes have 12 spindle speeds in geometric progression, with a 3-lever, color-match, direct-reading shift mechanism. The spindle is rigidly mounted. Cincinnati Lathe & Tool Co., Cincinnati 9.

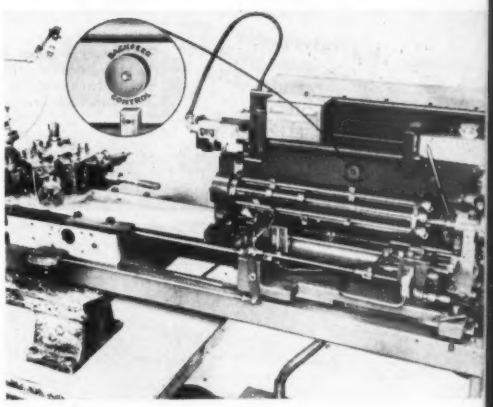
Inform-A-Gram No. A9.



TURRET BACKFEED

With the Lynn Hydraulic Drive by Lincoln Industries, 1123 S. 7 St., Minneapolis 4, Minn., it is possible to put many cross slide operations on the turret, speeding up production. For example, when machining the I.D. of a piece where tool marks are not permissible, the unit makes it possible to make a rough cut going in and a finish cut coming out.

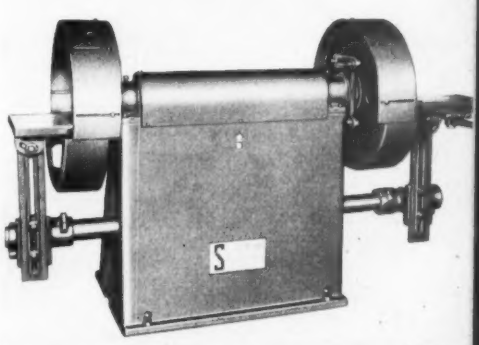
Inform-A-Gram No. A10.



DISC GRINDERS . . .

Here's the 30" redesigned heavy-duty double-end disc grinder by The Standard Electrical Tool Co., Mt. Hope & Sixth St., Cincinnati 4. It has a plain swivel table at the left and lever feed table at the right. Telescopic wheel guards compensate for wear on the height of the machined, balanced disc wheels.

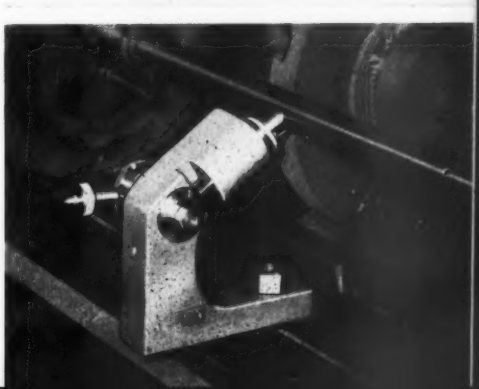
Inform-A-Gram No. A11.



STEADY-REST . . .

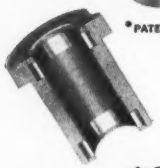
Designed to give stabilizing support from rear and underneath the workpiece in O.D. grinding operations, Steady-Rest maintains constant pressure against the workpiece. Last Word Sales Co., 18500 Mt. Elliott, Detroit 34.

Inform-A-Gram No. A12.



INCREASE PRODUCTION.. SAVE TIME & MONEY ON YOUR DRILLING OPERATIONS

*PATENTED



MEYCO

Carbide Inserted Bushings last longer, cost less in the long run

Here is a bushing that combines the best features of steel and carbide; the strength of steel and the long life of carbide. First cost: slightly higher than ordinary steel bushings; their life: many, many times as great. In addition to such obvious savings, MEYCO bushings increase the life of drills and reamers, produce accurate work for a longer period of time, save on machine-down time and on nonproductive man-hours.

☆

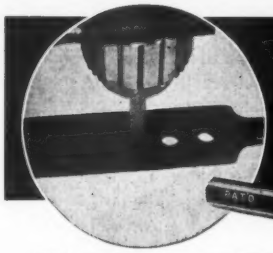
Auto manufacturer says: "... the steel bushings previously used averaged about 28 hours life. MEYCO bushings ran 1,168 hours before they were unusable."

For information and prices write for Meyco Bushing Catalog No. 17

W. F. MEYERS CO., INC., BEDFORD, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 1181

Drill Hardened Steels without Annealing—



USE The New IMPROVED "HARDSTEEL" DRILL

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon—high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It— With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1368 East 222nd St. • Cleveland 17, Ohio

Also makers of— BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS *Write for information*

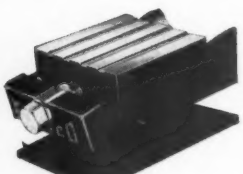
CIRCLE INFORM-A-GRAM KEY NO. 1182

Improved Empco JACKS are stronger!

SAVE TIME SETTING UP AND LEVELING YOUR MACHINES WITH FAST, ACCURATE, SELF-ALIGNING LEVELERS!

You can meet hurry up demands for relocation of machinery quickly and easily with improved EMPCO JACKS. You just raise the machine enough to slip EMPCO JACKS under the base (the number depending on the size of the machine). Turn the adjusting screw up or down until the level indicator reads "zero," and the job's done.

To reduce vibration, VI-SORB mounting pads are available with each style EMPCO JACK. Write for specifications and prices today.



Style JD Wedge type

Style JS Screw type

EMPCO PRODUCTS

THE ENTERPRISE MACHINE PARTS CORPORATION
2735 JEROME AVENUE • DETROIT 12, MICHIGAN

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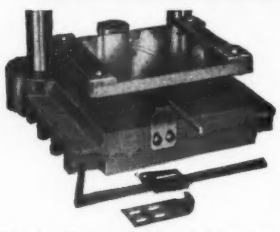
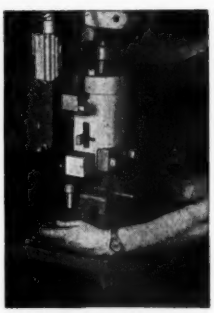
Adjustable Automatic Stock FEED STOP for DIES

Dahlstrom Light Duty **AUTOSTOP**





No drill jig... No slotting... No milling...

$1.75

TO INSTALL: Just drill one 7/32-inch hole, then drill and tap four mounting holes per directions. That's all there is to it!

Trial order $1.75 each; lots of 12 $1.50 each. State whether for use on compound or progressive dies. *Write for free pamphlet.*

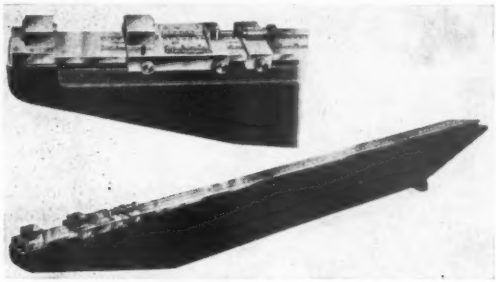
Tested and improved through the years, the Dahlstrom Autostop will save hours of your high priced labor. Adjustable to work with blanking, progressive and compound dies. Mounts on stripper plate in 15 minutes. Handles sheet steel up to 1/16" x 6" or equivalent weight.

By the makers of the **DAHLSTROM TAP GUIDE**

Branch MANUFACTURING COMPANY
NORTH BRANCH • MINNESOTA

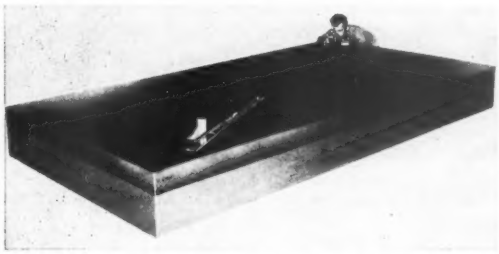
CIRCLE INFORM-A-GRAM KEY NO. 1184

Chesterman Length Measuring Machine introduced by George Scherr Co., is for external and internal measurements, having a range up to 120". The reading is by steel scale and extra large (2.450" long) vernier marked to



0.001" and 1/50 mm. This machine is recommended for use as a "Master" for accurately setting large micrometers, gages, standard bars, etc. Contact the George Scherr Co., 200 Lafayette St., New York 12, for complete details.
Circle Inform-A-Gram No. A13.

Surface Plates. Lawley now combats and nullifies harmful outside vibrations by mounting all of its precision surface plates on resilient neoprene vibration-damping mounting pads. The black diabase used in the



manufacture of the plates is free of internal stress. It cannot be warped by temperature changes or shock. For complete information on all Lawley surface plates write to Lawley Granite Surface Plate Co., 2000 Wyoming Ave., Wyoming, Pa.
Circle Inform-A-Gram No. A14.

Valve Type Can Be Changed in the field by using Beckett-Harcum interchangeable actuator assemblies which are easily mounted to the basic "Hi-Cyclic" valve body because of simplified "snap-on" construction of internal parts. All normally used actuators such as hand

lever, fingertip or foot lever, piloted, and cam roller, are available. By stocking a few basic valves and actuator assemblies, the valve-user can have an entire series of such valves on hand. Bulletins 130 and 131, from Beckett-Harcum Co., Wayne Rd., Wilmington, Ohio, give complete details on this new line of "Hy-Cyclic" air and hydraulic mechanical valves.
Circle Inform-A-Gram No. A15.

ELIMINATE TIME CONSUMING Hand Separation of Sheet Steel

with the VERSON SHEET FLOATER

By magnetic action, the Verson Sheet Floater ends the problems of hand separation in the feeding of sheet steel to presses, brakes and shears. Sheets formerly difficult to get ahold of are quickly and easily separated by the Sheet Floater—ready for the workers' grasp. Available in two models—Standard and Heavy Duty. Either model will handle rectangular, round or irregular shaped pieces. Write today for further information and prices.

A Verson Press for every job from 60 tons up.

Verson **VERSON ALLSTEEL PRESS CO.**

9335 S. Kenwood Ave., Chicago 19, Ill. So. Lamar at Ledbetter Dr., Dallas, Tex.

CIRCLE INFORM-A-GRAM KEY NO. 1191

SOLVE YOUR HOLE ACCURACY PROBLEM with *Horberg* PRECISION PIN GAGES

EXCLUSIVE CONCENTRIC ENTRY TAPER for faster, more definite inspection of holes, for greater ease in centering. Gage sets supplied for all common drill sizes.

TOLERANCE +0.0001 -0.0000

SETS: Two gages in each set, with convenient stand.

Letter Set (A-Z) 52 Gages $50.00

Fraction Set (1/64-½, in steps of 1/64) 60 Gages 56.00

Number Set (1-60) 120 Gages 104.00

ALL SHIPMENTS FROM STOCK

THE *Horberg* GAGE COMPANY

Affiliate of Horberg Grinding Industries, Inc. 21 Staples St., Providence, R.I.

Please send Horberg Pin Gage Catalog to

NAME _____

TITLE _____

(Please attach to company letterhead)

CIRCLE INFORM-A-GRAM KEY NO. 1192

NOW Non-Glare SCALE and VERNIER with the FOSTER STAINLESS HEIGHT GAUGE

No more squinting, tilting to avoid reflection, magnifying-glass reading, causing undue eye-strain.

Vernier is 1.225 or twice that of ordinary gauges.

Write today for complete literature on the amazing FOSTER Height Gauge which will eliminate errors and increase reading-facility.

- Stainless Scale, Chrome-Plated.
- Extra Long Stainless Vernier, Chrome-Plated.
- Stand-out Numbers and Divisions.
- Chrome-Satin Finish Graduations.

Sizes: 12" to 48"

FOSTER
SUPPLIES COMPANY
6122 Milwaukee Avenue
Chicago 30, Ill.
Tel.: NEwcastle 1-8888

CIRCLE INFORM-A-GRAM KEY NO. 1201

"IN-STOCK" SERVICE ON FAMOUS SPHINX BRAND MICRO-DRILLS

High speed drills for small holes. Sizes from .08 mm (.003") to 1.0 mm (.040") carried in stock, in increments of .01 mm (.0004").

Sphinx brand micro-drills used throughout the world for many years for all fine watch and instrument work.

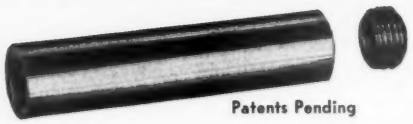
Send for Bulletin N listing sizes and prices of stock drill sizes and micro-drilling equipment.

These precision drills are available in two styles, flat pivot drills or spiral fluted drills. They are made with concentric oversize shanks. Because of their rigidity they are especially useful in all types of drilling equipment.

LEVIN (R) Louis Levin & Son, Inc.
3610 South Broadway • Los Angeles 7, California

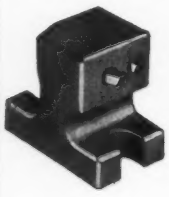
CIRCLE INFORM-A-GRAM KEY NO. 1202

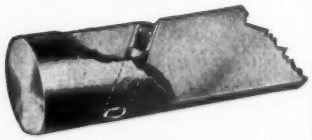
How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.





The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3/16, ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾, 1"

STURDY BROACHING SERVICE
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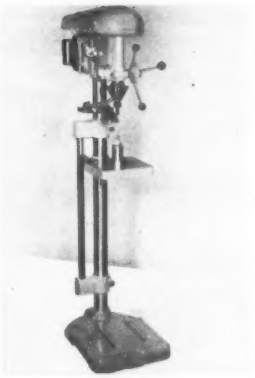
DAYTON ROGERS
Manufacturing Company
Minneapolis 7B, Minnesota

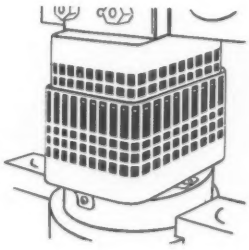
CIRCLE INFORM-A-GRAM KEY NO. 1204

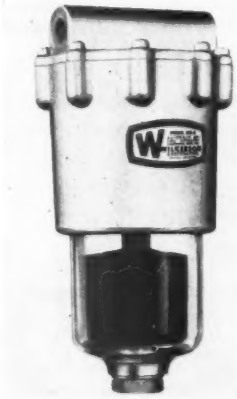
Center Lapping Machine. The many advantages of the new center lapping machine introduced by Qualified Gage Co., 4030 W. 11-Mile Rd., Berkley, Mich., include spring cushion tailstock to prevent lapping stone from breaking, loading, or burning; positive dressing form from lifetime cam; fingertip dresser infeed; fast dressing; and same arm motion is used for dressing and lapping. Spindle speeds range from 580 to 5200 rpm and the machine can take work to a diameter of 12". **A16.**



Fixture Clamps. Positive right angle clamping is obtained by use of the three point rocker action in Harco fixture clamps. The contacting point of the clamp bar is radiused to correct mis-alignment due to a variance in the thickness of the parts being clamped. Harco clamps are available in several sizes and lengths for either hand or wrench clamping. Harco Engineering, 12092 Woodbine Ave., Detroit 28, Mich. **No. A17.**

Do-It-Yourself safety guards for gears, belts, punch press dies, etc., are quickly and economically made with standardized guard parts manufactured by the Harrington & King Perforating Co., 5655 Fillmore St., Chicago 44. Guards can be designed, assembled, and installed right at the point of use and when properly made they will receive full state and insurance approval. Details are available from the manufacturer. **No. A18.**





A Snap Action Automatic Float Unit for separating moisture and other contaminants from compressed air lines has been developed by Wilkerson Corp., 3395 S. Platte R. Dr., Englewood, Colo. Stock sizes in Series 150 are now available for ¼" to 3" lines, and for operating pressures of 10 to 250 psig. Designed for either continuous or intermittent flow lines, the unit operates without pressure drop. A built-in filter screen protects operating parts from rust and grit.
Inform-A-Gram No. A19.

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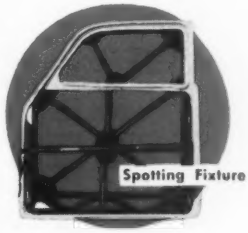

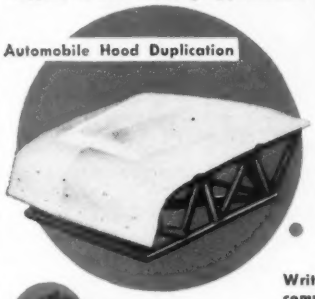

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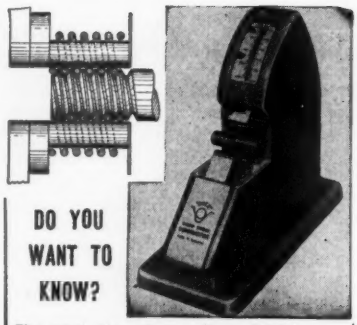
CIRCLE INFORM-A-GRAM KEY NO. 1211

NEW ADJUSTABLE DRILL JIG
eliminates layout; cuts drilling time

Used for drilling holes through round stock and hex stock from ¼" to 2" and cap screws from ¼" to 1¼", the new Mathewson Adjustable Drill Jig eliminates layout and can cut drilling time on small lots to a fraction. And it eliminates the costs of special jigs for larger quantities. Holes for cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws, are all typical of the operation that can be done more economically with this jig. Hole diameters range from .052" to .531", using your A.S.A. standard slip bushings. The hardened V-block has two 60-degree V's for centering round or hexagonal stock, one for ¼" to 21/32" diameter, one for 21/32" to 2" diameter. Adjustable stop for locating work longitudinally for drilling any distance from end, may be used on either side. Adjustable bushing carriers hold slip bushings and clamp work securely. Jig highly successful in permitting use of inexperienced drill operators. For circular write to: **Mathewson Machine Works**, 38 Hancock St., Quincy, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1212



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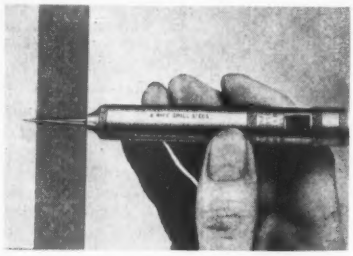
DAYTON ROGERS *Manufacturing Company*

Minneapolis 7, Minnesota

CIRCLE INFORM-A-GRAM KEY NO. 1223

A Direct-Reading Hole Gage which measures the internal diameters of small holes from 0.020" to 0.130" with accuracy within 0.0005" has been introduced by New Standard Div'n U. S. Expansion Bolt Co., York, Pa. Called "Kwik-Chek," it



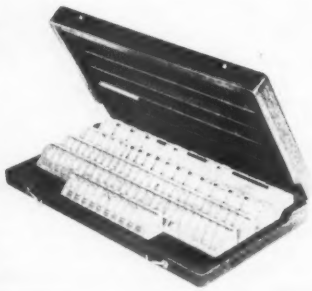
is similar in appearance and operation to a ball point pen and measurements can be made using one hand. The direct-reading scale is graduated in thousandths of an inch, and a built-in magnifier enables the user to obtain readings to the nearest half-thousandth.

Circle Inform-A-Gram No. A20.

"Throw-Away" Carbide Inserts which may be turned over and used on each side prior to disposal are the latest addition to the Kennametal Kendex line of tungsten carbide tooling. Use of these inserts eliminates all grinding in the user's shop, cuts cost per cutting, and, with replaceable carbide chipbreakers, provides a new system of chip control. Available in two types — button tools and heavy-duty tools — the inserts are ground to index within ±0.005" in seconds. Kennametal, Inc., 600 Grant St., Pittsburgh 19, will send you further information.

Circle Inform-A-Gram No. A21.

"Laboratory Master" Gage Blocks by Webber are said to be the nearest approach to absolute dimensional perfection ever attained, with measuring standards certified accurate within ± 0.000001". These chrome



carbide blocks are recommended as measuring standards for manufacturers of gage blocks, precision instruments, gages, bearings, and mechano electronic devices. Each set contains 82 blocks. G. B. Webber Gage Co., 12899 Triskett Rd., Cleveland 11.

Circle Inform-A-Gram No. A22.

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L&J Presses are producing work of better quality in larger volumes at reduced costs for numerous manufacturers. Here's why they do it:

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- **Balanced designing plus precision manufacture for better performance and dependability.**

These are but a few of the reasons why L&J Presses can improve your press work and affect economies. 17 O.B.I. models—6 to 80 ton capacities—all available with air clutches. *Write for literature.*

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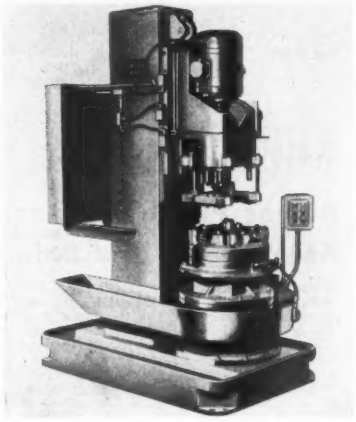
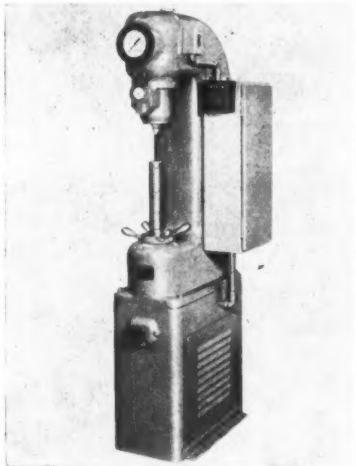
CIRCLE INFORM-A-GRAM KEY NO. 1224

Small Production Shop Operators, especially, should be interested in the new Michigan Drill Head way-type hydraulic feed machine, the "Hydro 3". The width of the ways on the machine is 7½"; stroke, 10"; and feed thrust, 3100 lbs. Index tables are available with built-in



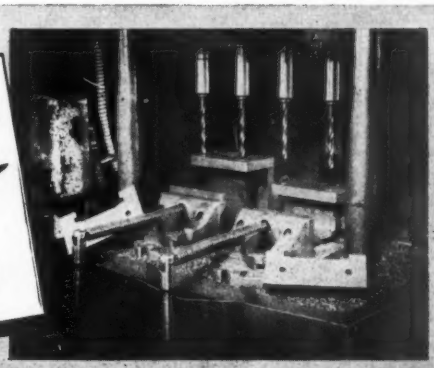
safety features. They are driven by a fluid-drive motor, and the three available sizes (20", 30" and 42") can be bored for any number of stations ranging from two to 15. Michigan Drill Head, 971 E. 8 Mile Rd., Hazel Park, Mich. can answer your questions on the "Hydro 3".
Circle Inform-A-Gram No. A23.

"Color-Glance" Hardness Tester. Three colored lights, which signal the relative Brinell hardness of the test piece, make all the decisions of acceptability or rejection on Steel City Testing Machines' new "colorglance" Brinell hardness testing machines. Tied in with some automatic means



of handling the parts on a production line, the unit can be made automatic. Basically the new machine is the same as the company's direct reading type testers, models KDR-6 and KDR-10. Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38.
Circle Inform-A-Gram No. A24.

Here's PROOF that -SPEED VISE- is a fast production tool



Here's a production set-up on a multiple spindle semi-automatic drilling machine that is really cutting manufacturing time and costs. The use of two Speed Vises eliminates the need for expensive and complicated fixtures and at the same time increases the production range. With Speed Vise it is only necessary to make a simple jaw plate to fit the parts being machined and to hold drill bushings, etc.

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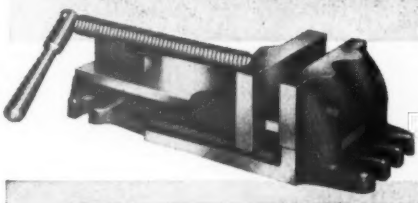
★ Standardized holes for attaching jigs or jaw plates.
★ Lift...slide...lock...that's all there is to the fast, positive locking action.
★ Heavy, semi-steel castings for extra strength and a heavy base plate for rigidity.



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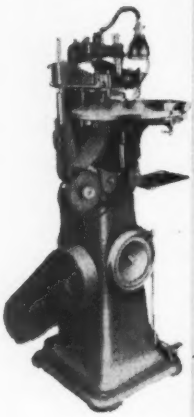

Dependable and proved are OLIVER Die Makers. They reduce costs as much as 60% because they simplify sawing, filing and lapping operations. The Oliver Method saves time and does not require expansive hard-to-get skilled labor. These efficient, speedy and accurate machines have proved themselves in more than 10,000 installations throughout the world. In many plants these durable OLIVERS have been in constant use for over 25 years.

For nearly 40 years OLIVER DIE MAKING MACHINES have been found invaluable on such jobs as Production Filing, Experimental Work, Metal Patterns, Cams, Gages, Templates, etc. Improve your toolroom efficiency . . . For *better* dies—saw and file with OLIVER DIE MAKING MACHINES.

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Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

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TOOL & CUTTER GRINDERS
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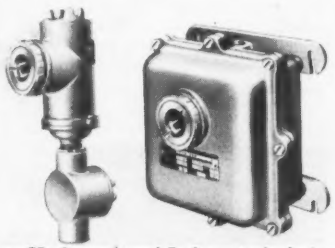
CIRCLE INFORM-A-GRAM KEY NO. 1241

A New Automatic Control "Brain" which will control any electrical machine operating through a cycle has

just been introduced by Johnson Fare Box, Inc., 4619 North Ravenswood Ave., Chicago 40, Ill. The automatic timer and control unit provides for full sequential production use.
Circle Inform-A-Gram No. A25.

Automation Techniques can be employed in hazardous industrial areas by use of a new system of explosion-proof Condulets, consisting of a light source transmitter and a photoelectric tube receiver. Lens focal limits are 6" to infinity. Carry-

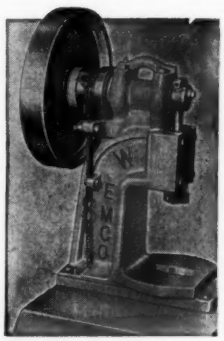


ing Underwriters' Laboratories' classification for use in Class I, Group D hazardous locations, these Condulets are a product of Crouse-Hinds Co., Wolf & 7th N. Sts., Syracuse, N. Y.
Circle Inform-A-Gram No. A26.

Taper shank drills, reamers, end mills, etc. can be used over and over again regardless of broken or worn tangs, thanks to the new "Pilot" flexible sleeve with Morse taper. When engaged the sleeve adapts it-

self to any surface irregularities around the tool and inside the spindle of the machine, becoming one solid assembly. For further information contact Pilot Tools, Inc., 225 Lafayette St., New York 12.
Circle Inform-A-Gram No. A27.

EMCO "W", 5-ton bench type; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.



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Versatile EMCO presses excel for punching, forming, stenciling and riveting metal, leather, plastics and other non-metallic materials. Up to 300 operations per minute. "Big machine" speed, strength, rigidity, accuracy, endurance. Compact, foolproof; simple design—easy to operate. Thousands of EMCOS in money-making use testify to Klaas dependability since 1921. Two practical sizes.

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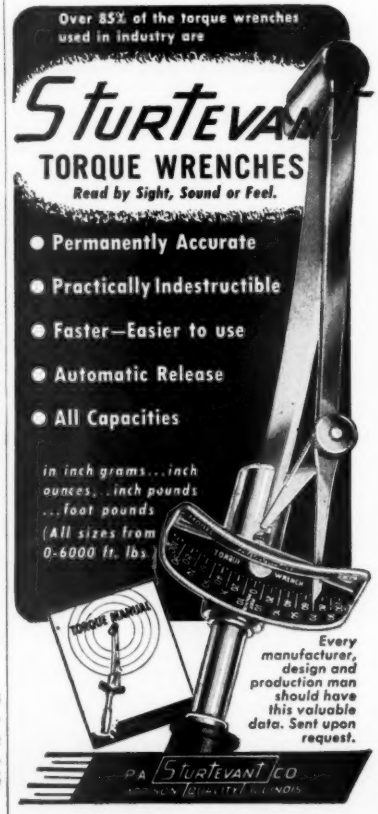
- Automatic Release
- All Capacities

in inch grams...inch ounces...inch pounds ...foot pounds
(All sizes from 0-6000 ft. lbs.)

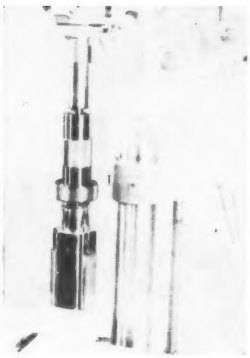


Every manufacturer, design and production man should have this valuable data. Sent upon request.

P.A. STURTEVANT CO.

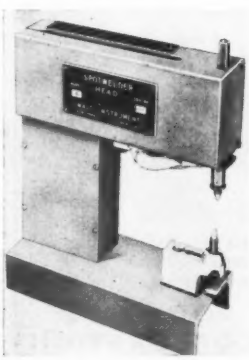
CIRCLE INFORM-A-GRAM KEY NO. 1243

Expandable Mandrel Driver. A new driver with three expandable mandrels which bayonet into the driver, designed for vertical use in drill presses for honing within a range of 3" to 6", has been developed by Superior Hone Corp., 1619 Elreno St., Elkhart, Ind. The mandrel allows for a 1" expansion, picking up ranges in 1/16" by simply changing a combination of shims and inserts which are doweled into the body and held by set screws. **Circle No. A28.**



Advantage of the "Keyhole" Design, adapted as "standard" by Scully-Jones, is that it eliminates damage to machine bearings and spindles often caused by hammering on conventional drifts. The cam-shaped tip of the ejector rotates against the top of the tang, pushing the tool from the spindle in one motion. Ejectors are available from Scully-Jones, 1901 S. Rockwell St., Chicago, in five standard sizes. **Inform-A-Gram No. A29.**

Drill Press. The 1600 Series, Universal Gear Works' heavy duty, precision built drilling units, offer many features and advantages found only in higher priced models. Available in bench and floor models, with standard or production tables, they may be had in single or multiple spindle units. The 1600 Series has a full 16" swing and spindle travel of 6". A push button motor switch is built in and it has adjustable spindle return stop, and quill lock handle. Universal Gear Works, Inc., 1301 E. McNichols, Detroit 3.
Inform-A-Gram No. A30.



Spot Welder. The Ewald Model 4 precision spot welder head is designed for use with miniature parts from ⅛" to 0.0005" combined thickness and is applicable to precision welding of very small parts usually considered difficult to weld. For short welding cycles and reliable follow-up forging action, the weight of the moving parts of the head has been reduced to less than 4 oz. Welding pressure can be adjusted from 6 oz to 15 lbs. Write to Ewald Instruments, 93 Nassau St., New York 38.
Inform-A-Gram No. A31.

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CUT DIE COSTS 25%

Low-costing Elasticone Guide Pin Covers reduce die breakage; protect man & machine — closes the gap between pins and bushings.

Just snaps into place—no installation costs. Manufactured in stock sizes.

Write for full information and literature.

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2210 EAST HUNTINGDON ST. PHILA. 25, PA.

CENTRAL SAFETY EQUIPMENT COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 1262

Drill More Holes Per Hour
In ANY Pattern . . .
On ANY Drill Press

with a *Adjustable* MULTI-DRILL

DRILLS 2 to 8 HOLES at ONE STROKE

Increase production up to 800% . . . save time, cut costs. MULTI-DRILLS make *any* drill press produce *more*. Attached without alterations or special tools. Quick, easy setups of universally adjustable spindles give you more flexibility . . . wider application. Handles any hole pattern within 9" circle; centers close as ½". Extension Spindles available to increase working area to 22½". Special adaptations available.

model 900

DRILLS ANY HOLE PATTERN

See your Commander Distributor for complete details. Write for the NEW Commander Full Line Catalog.

COMMANDER MFG. CO.

4228 W. Kinzie St. • Chicago 24, Illinois

Product of *Commander* . . . Builder of Production Tools

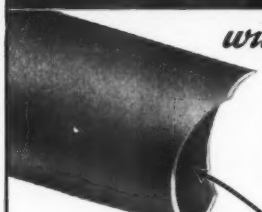
CIRCLE INFORM-A-GRAM KEY NO. 1263

Notch 750 PIPE ENDS PER HOUR

with ARC-FIT

REG. U.S. PAT. OFF.

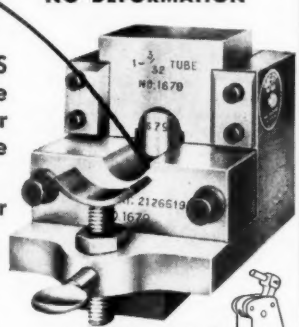
CLEAN NOTCHES
NO EXTRA FINISHING
NO DEFORMATION



Standard ARC-FITS notch ½" to 2" pipe for "T" joints. Dies for each size. Immediate shipment.

Special ARC-FITS for angular cuts or larger sizes. Send drawing and material specification for quotation.

Send for descriptive bulletin



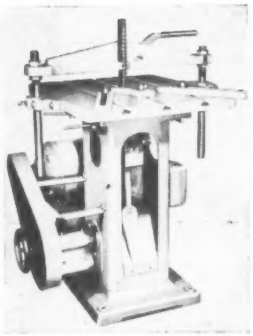
Standard Arc-Fit works well in our special HAND PRESS

VOGEL TOOL & DIE CORPORATION

1817 N. 32nd AVE. • MELROSE PARK, ILL.

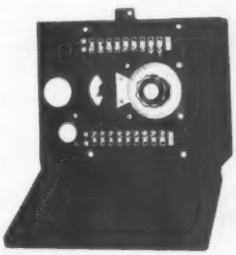
CIRCLE INFORM-A-GRAM KEY NO. 1264

Northfield Keyseater, Model K-6, is designed to cut straight or tapered internal key ways from ⅛" to 1" in width. Work of any diameter and shape that can be clamped to the table can be cut, grooved, or slotted on this machine. A multi-tooth broach eliminates breakage common in cutters of single tooth design. Contact Northfield Foundry & Machine Co., Northfield, Minn., for further information. **Circle No. A32.**



Cutting Wheels. Here's a cutting wheel for all non-ferrous metals, that are said to do away with "clogging". Made of high-grade steel, properly tempered, thousands of small pits machined in the surface give the same results as grinding or emery wheels with no clogging. The wheels are reversible and can be reconditioned at low cost. Schmidgall Mfg. Co., 307 Cass St., Peoria 2, Ill. **Inform-A-Gram No. A33.**

Electronic Timer. Features of the precision general purpose Ferrara electronic timer include three time ranges (0.1-1 sec, 1-10 sec, 10-100 sec); direct reading time dial; two SPDT load contacts with 8-amp rating; and 1% accuracy. The Model T2 timer is designed for use on process timing, sequence control of automated equipment; induction heating equipment, conveyors, machine tools, injection molding machines, packaging and filling machinery etc. Write to Ferrara, Inc., Dept. E-6, 8106 W. Nine Mile Rd., Oak Park 27, Mich. **Circle Inform-A-Gram No. A34.**



Convert a Manually Operated Punch Press to automatic operation with the hydraulically driven feeding and straightening machine manufactured by the F. J. Littell Machine Co., 4127 N. Ravenswood Ave., Chicago 13. This Model 418-HRP straightening machine will

handle stock up to 0.125" thick. Units with roll widths of 12½", 18½", and 24½" are available, with various speeds for synchronizing feeding and punching productions. **Circle Inform-A-Gram No. A35.**

POLISH · GRIND · BURR · SHARPEN

IN SECONDS . . . WITHOUT TEARING DOWN SET-UPS

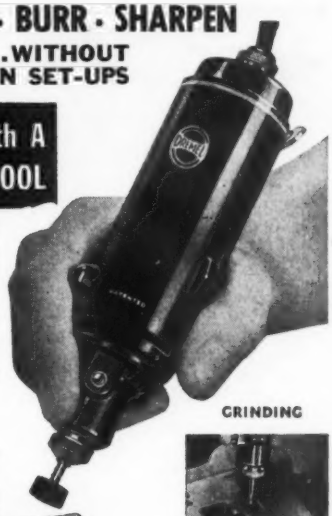
Do It Faster With A DREMEL MOTO-TOOL

Dremel Moto-Tools are used in many different types of industries by thousands of diemakers, machinists and hobby craftsmen for polishing and grinding dies, burring parts, sharpening cutters, etc. A money-maker and time-saver, the Moto-Tool does close work in seconds without tearing down costly production set-ups.

APPROXIMATELY 27,000 R.P.M.

MOTO-TOOL NO. 2, with one emery wheel point **$17.85**

MOTO-TOOL KIT NO. 2, with 23 accessories (high speed steel cutters) and Model 2 Moto-Tool in sturdy steel case **$29.95**



GRINDING

SHARPENING

BURRING

See Your Nearby Industrial Distributor or write for catalog.

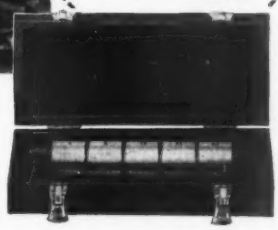
DREMEL MFG. CO., Dept. 524-M, RACINE, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 1271

Check Surface Roughness Waviness and Lay INSTANTLY

. . . Right At The Machine

With ACME'S ROUGHNESS COMPARISON SPECIMENS



Consists of various surface specimens, *individually finished* to definite micro-inch readings, grouped together in one handy comparison bar. Merely hold bar opposite work for fast, visual comparison check of surface roughness, waviness and lay.

Available in groups of 3, 5 and 8 specimens. Low cost. Write for details, now!

Mfr's. of Drill Jig & Fixture Bushings

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CIRCLE INFORM-A-GRAM KEY NO. 1272

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. . . ACCURATE PRODUCTION
. . . At Lower Cost?

Then check up on Rousselle—for everything about them is aimed at achieving just that.

It took down-to-earth planning, stressing ruggedness and simplicity, along with accurate machining and "close-tolerance" assembly to bring out these rigid, high-output units—THAT COST SO LITTLE—DO SO MUCH—REQUIRE SO LITTLE MAINTENANCE!

That's why they're used throughout industry to shear, punch, bend and form metals; cut and punch paper; form and trim fibre, plastics, etc.

YOU'LL LIKE THE PRICE—when you get our quotation and compare specifications and quality. So let our engineering staff assist you—often they can suggest worthwhile savings—no obligation. Simply explain the problem and send sample or drawing of work.

O. B. I. PRESS

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Rousselle Presses are Sold Exclusively through Leading Machinery Dealers

ROUSSELLE PRESSES

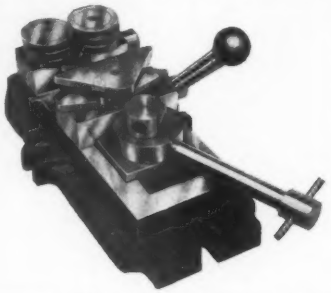
Rousselle Presses are Manufactured by

SERVICE MACHINE CO.

7627-33 S. Ashland Ave., Chicago 20, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1281

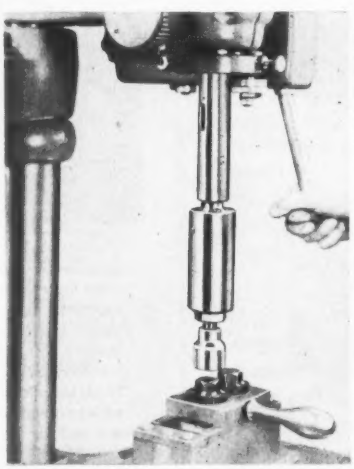
Varijaw Speed Vise. Features of the Improved Model B Prestoflex vise include individual locking cams for each series of self-contained jaw plates; new design making individual replacement of special purpose jaw-



plates feasible; jaw retainer pins are pre-drilled and tapped with 5/16" x 18 thread for quick attachment of drill bushings or other fixture parts. For further information on this versatile holding device write to The Custanite Corp., Larchmont, N. Y.
Circle Inform-A-Gram No. A36.

Clovis Black Granite Surface Plates have been added to The Challenge Machinery Co.'s precision equipment line. Composed of "deep earth" granite finished by a special rotary honing process, these surface plates are of a pureness, grain, and density rated Class A by the National Bureau of Standards. Available in 24 sizes, from 9" x 12" x 3" to 72" x 144" x 16", they may be obtained from Challenge, Grand Haven, Mich., with or without ledges in eight standard accuracies from 0.002" to 0.000005".
Circle Inform-A-Gram No. A37.

A Small Torque Wrench that is adjustable for any predetermined torque from 5 to 45 lbs may be used as a hand tool, with portable power tools, or on machine tools for single



or multiple spindle operations. Write for "Acuritork" folder 251P, B. E. Parish Co., 3340 Fenkell, Detroit 38, Mich.
Circle Inform-A-Gram No. A38.

SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS

IMMEDIATE DELIVERY FROM STOCK

3AT, 3C 1A, 4C 5C

480 (AC-50)

All collets in hexagon, square and round.

KLUTCH-KOLLET

Step collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

FOR ATLAS • LOGAN • SOUTH BEND CRAFTSMAN • SHELDON LATHES, ETC.

LEVER-TYPE DRAWBAR ½" cap.

Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

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HAND DRAWBAR ½" cap.

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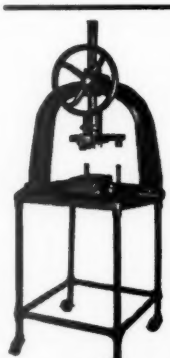
Integrity Since 1919

CIRCLE INFORM-A-GRAM KEY NO. 1282



COMPLETE THE DIE-SET AT YOUR BENCH

Lacey Die-Set Machine

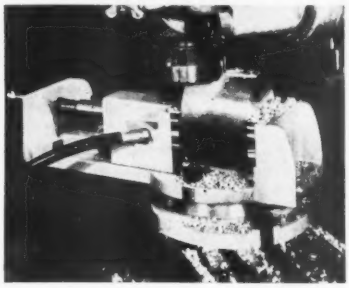
Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the diemaker to complete a die-set at his bench . . . saves toolroom and handling costs. Ask today for full details.

Sole Distributors

MOORE SPECIAL TOOL CO., INC.
726 Union Avenue Bridgeport 7, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1283

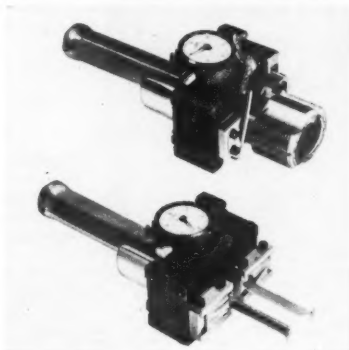
An Air-Powered Hydraulic Vise, which combines the speed of an air vise with the strength, compactness, and locking force of a hydraulic vise, is being marketed under the trade mark "WiltOmatic M-M". A touch of the toe places a force of 9000 lbs



on the jaws of the vise. Normal air line pressure is 90 lbs, although the vise functions on any pressure from 20 to 140 psi. Wilton Tool Mfg. Co., Inc., 925-941 Wrightwood Ave., Chicago 14, will supply complete information.
Circle Inform-A-Gram No. A39.

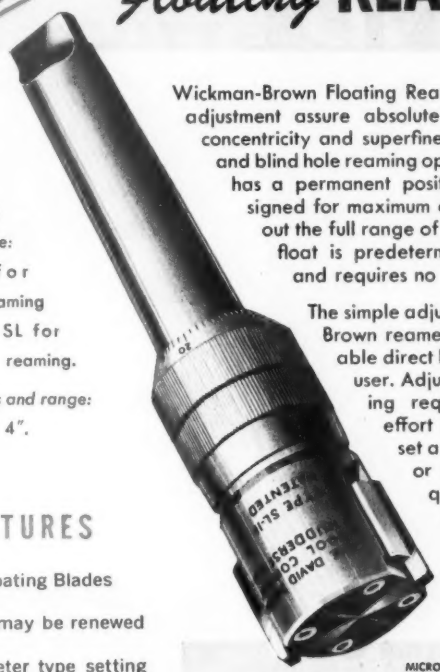
An Air Hoist with a 150 lb capacity for light handling operations has been announced by the Keller Tool Co. Handy controls allow the operator to raise or lower the load and swing it into position with one hand, leaving the other hand free to control other parts or machinery. Speed rates are from a slow creep to 40' per min. through a 9' lifting range. The hoist weighs but 14 lbs and is suspended by its cable from any overhead support. Keller Tool Co., Grand Haven, Mich.
Circle Inform-A-Gram No. A40.

Interchangeable Segments on the Bryant P-21 Gage allow both internal threads and grooves to be checked with one gage. Model P-21 is built on the principle of an "expanding" plug which actuates a precision dial indicator showing the size compari-



son of the part to a master setting ring. Threads of 5/16" to 5" diameter can be checked and diameter and roundness of internal grooves up to 5" in diameter at depths to 1" to 2" from a face. Bryant Chucking Grinder Co., Springfield, Vt.
Circle Inform-A-Gram No. A41.

Easy To Use Floating ADJUSTABLE REAMERS



Wickman-Brown Floating Reamers with micrometer adjustment assure absolute accuracy, complete concentricity and superfine finishes on standard and blind hole reaming operations. Each reamer has a permanent positive float that is designed for maximum effectiveness throughout the full range of the reamer. Optimum float is predetermined in manufacture and requires no adjustment.

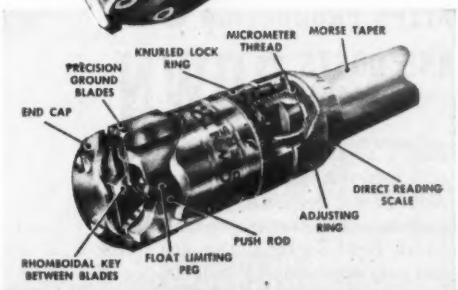
Two types are available: Type S for standard reaming and Type SL for blind hole reaming.

Reamer sizes and range: from ¾" to 4".

The simple adjustability of Wickman-Brown reamers results in considerable direct labor economy for the user. Adjustment to desired seting requires only the skill, effort and time needed to set a micrometer—no keys or special tools are required. Blades may be sharpened in usual manner without affecting micrometer readings.

FEATURES

- Fully Floating Blades
- Blades may be renewed
- Micrometer type setting
- No special tools required for setting
- No gears or springs
- Positive and constant float
- Operates rotating or stationary



THE Wickman MANUFACTURING CO.
10329 CAPITAL AVENUE
(OAK PARK)
DETROIT 37, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1291

HARDENED and GROUND HSS BLANKS

Any decimal diameter to ½"—in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.

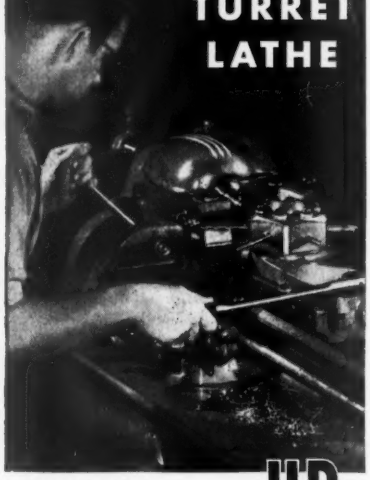
Write or Phone ORange 3-4301 for price list D-3

WILLIAM T. HUTCHINSON COMPANY
235 Main St. Orange, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1292

SOUTH BEND

900 TURRET LATHE



BASE PRICE $975

KEEPS PRODUCTION UP AND COSTS DOWN

Here's a precision turret lathe that will help you increase production and reduce costs on precision parts. High output comes easy on the Series 900 South Bend Turret Lathe. It's quick and easy to operate. A wide range of speeds and power carriage feeds contribute to efficient machining. Close tolerances can be held without sacrificing speed. These features make the Series 900 Turret Lathe ideal for second operation work. If you are producing small precision parts, it will pay you to find out more about South Bend Turret Lathes which are made in three sizes: ½" to 1" collet capacity, 9" to 16" swing. Write for catalog on Engine Lathes, Toolroom Lathes, Drill Presses and Shapers.

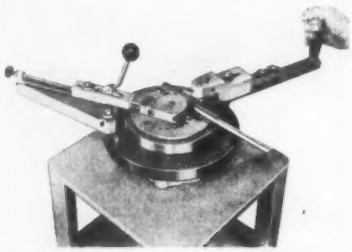
SPECIFICATIONS

Collet Capacity: ½". Spindle Bore: ¾". Swing: 9¼" over bed, 3⅞" over double tool cross slide, 5½" over compound cross slide. Turret to Spindle Distance: 20⅝". Twelve Spindle Speeds: 41 to 1270 r.p.m. 48 Power Longitudinal Feeds. 48 Power Cross-feeds. 48 Thread Cutting Pitches R.H. or L.H. 4 to 224 per inch.

SOUTH BEND LATHE
Building Better Tools Since 1906
SOUTH BEND 22, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 1301

"Quik-Lok Clamp," a new material clamping device, is especially valuable when forming tubing, angle, channel, and extrusions on the No. 1 and 1A Di-Acro Bender because it locks the material securely in position and can be instantly released to



remove the formed part. Easily adjusted for any radius to 2" on the No. 1 model and 6" on the 1A, it will handle stainless steel tubing up to ½" diameter and round steel bar to ⅝". O'Neil-Irwin Mfg. Co., 626 Eighth Ave., Lake City, Minn.
Circle Inform-A-Gram No. A42.

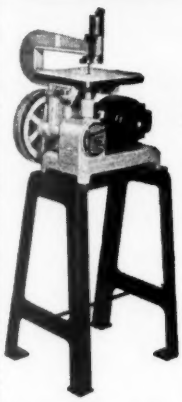
Spiral Side and Face Cutters of 18% tungsten high speed steel with a special tooth lip for maintaining cutting angle even after frequent re-

grinding are now being produced by Clarkson, Inc., makers of Autolock and Dedlock chucks and milling cutters. Because of the special tooth design, maximum speeds and feeds can be used for greater metal removal and fine finish. Clarkson, Inc., 4004 E. 8 Mile Rd., Detroit 34.
Circle Inform-A-Gram No. A43.

Tap-Drill Attachment. This is a combination attachment to drill, countersink, ream, counterbore and tap, all on one drill press spindle

without taking your hand off the drill press feed handle. Complete literature is available from Errington Mechanical Laboratory, Inc., Staten Island 4, N. Y.
Circle Inform-A-Gram No. A44.

CUT TOOL AND DIE-MAKING COSTS WITH . . . Milwaukee DIE FILERS PROFILE GRINDERS



DIE FILERS
. . . for straight-line sharp corner filing, sawing and lapping

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

Write for illustrated Bulletins and Prices

PROFILE GRINDERS
. . . for high speed Precision Grinding of curved and Irregular Contours

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

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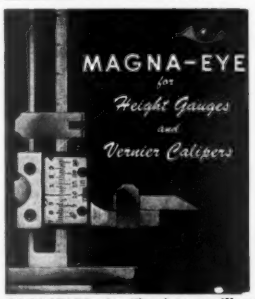
CIRCLE INFORM-A-GRAM KEY NO. 1302



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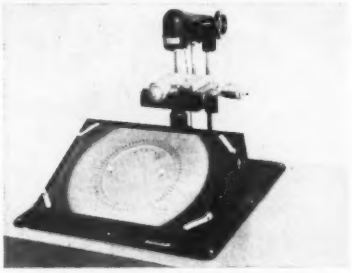
MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. LENS is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.
Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. 8 No. 100 for 6" Vernier Calipers; 8 No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; 8 No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" and 60" Calipers.
For Complete Information Write, Phone or Wire
STEBAR COMPANY
711 W. Lake St. Minneapolis 8, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 1303

Here's An Optical Comparator with a larger range—the micrometer stage has 2" longitudinal movement and 1½" cross movement—which will read directly in 0.0001" without vernier. Particularly useful where precise measurement of parts is necessary, the new Wilder Micro-Projector by George Scherr Co., incorporates all the features of the other models including vertical light beam with flat work stage, seven different magnifications from 10X to 100X, protractor charts for angular measurements reading to 5 min. of arc, and a Surface Illuminator. Write to George Scherr Optical Tools, Inc., 200 Lafayette St., New York 12.

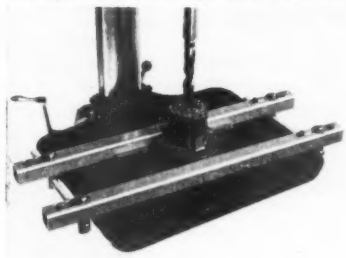


Circle Inform-A-Gram No. A45.

Ring-Former for Brazing. A compact, bench-type, air-operated tool automatically forms a ring of brazing wire directly on the part to be brazed. The operator merely places the part against the tool and a slight pressure activates the ring-forming mechanism. With the actual brazing, the ring melts down, forming a perfect bond. Calibrated adjustments permit the forming of rings from ¼" to 3" diameter. Keller Tool Co., Grand Haven, Mich.

Circle Inform-A-Gram No. A46.

Drill Press Vise. Even the most simple type of press has the flexibility of a radial drill with the "Dril-Lox" work-holding vise. Outstanding features of the Dril-Lox are twofold: drill torque on the workpiece automatically locks the vise, and workpieces in the vise find their own center since they are free-floating. Four sizes are now being offered, with vice capacities ranging from 5¼" to 8¼" to accommodate drill press tables from 8" to 25". Price and Rutzebeck, 22150 Meekland Ave., Hayward 151, Calif.



Circle Inform-A-Gram No. A47.

ALINA
KNURL CUTTERS

ALINA KNURL CUTTERS actually mill the pattern and produce chips in the process. Alina Knurl Cutters will cut your machining time approx. 30%. They will provide the solution to some of your most complex knurling problems.

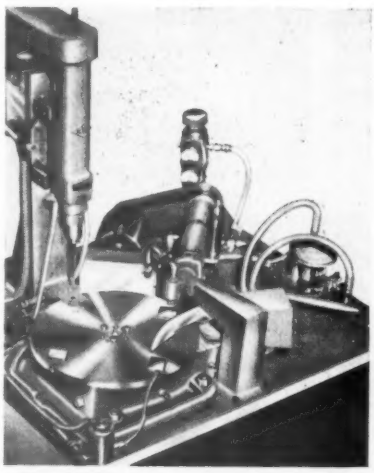
DESIGNED TO

- knurl all machineable materials
- knurl thin-walled parts without internal support
- maintain fine diametral limits
- knurl diameters from 1/16" to 10 ft.

Models available for all types of machines.
For detailed information and prices, write to

ALINA CORPORATION • 401 Broadway, New York 13, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1311



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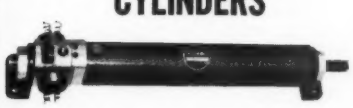
CYLINDERS



Plain or with Built-in Valves,
Up to 20" of stroke in stock

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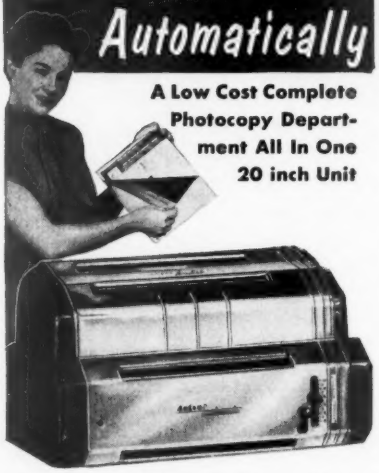
With Revolutionary Machine . . .

End Copying Bottlenecks Automatically

A Low Cost Complete Photocopy Department All In One 20 inch Unit



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Solve the problem of handling your paper work in a hurry with the new Apeco Systematic Auto-Stat. With this quick copying machine, thousands of firms have eliminated 35% of all typing and actually cut paper work in half. Anyone can operate it . . . just flip a switch and any papers, opaque or transparent, can be copied in seconds no matter if printed on one or two sides. It's low cost, too . . . priced within the budget of the smallest business.

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Find Out How You Can Save Time and Money in Your Business . . . .

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By speeding up Production and Engineering with Auto-Stat Copying.
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1936 W. Peterson Ave., Chicago 26, Ill. Dept. A

Rush me without obligation your new book the "Auto-Stat Story." I understand this is a report on Auto-Stat copying and shows how this machine can increase the efficiency of any business.

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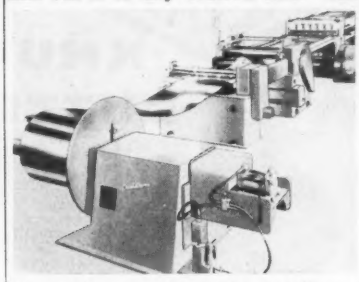
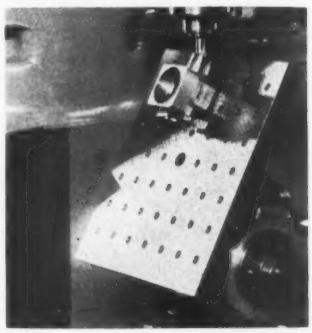
CIRCLE INFORM-A-GRAM KEY NO. 1321

Decoiling and Shearing with Dahlstrom's "Shear Line" results in less waste material because the user can use coil material instead of flat stock and cut it to any desired size. The

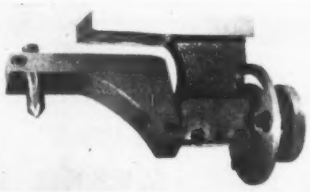


Shear Clear consists of hydraulic expandable mandrel coil reel, roll straightener, hump table, high speed shear, and conveyor-type measuring and take-off unit. Steel or aluminum of 12 gauge and lighter up to 72" wide can be handled. Dahlstrom Machine Works, Inc., 4227 W. Belmont Ave., Chicago 41.
Circle Inform-A-Gram No. A48.

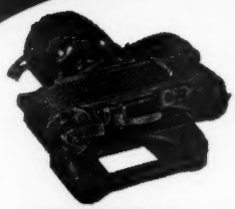
Angle Computer. This versatile measuring device accurately surveys the angles of precision machined parts, castings, and die work, reducing inspection time because it is possible to check work without removing it from the plate. Three axes of rotation — horizontal, vertical, and radial — are incorporated. All protractors are graduated from 0° to 90° in four sections of the circle and are equipped with verniers. Angle Computer Co., Inc., 1709 Standard Ave., Glendale 1, Calif.
Circle Inform-A-Gram No. A49.



A Spring Loading for the spindle of the "Mighty Midget" radius dresser cuts out practically all chatter. This means that less passes are required to cut a radius on a grinding wheel and that the dressing diamond will last much longer. Sperman Metal Specialties, 1085 Rogers Ave., Brooklyn 26, N. Y.
Circle Inform-A-Gram No. A50.



DOES IT BETTER
DOES IT FASTER



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ABRASIVE BAND GRINDER

The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

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WALLS SALES CORP.
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MICRO-HEIGHT GAUGE
BY FAIRFIELD GAUGE CO.

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

•

Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

Toolmakers, Layout men, and Inspectors do better work faster with Micro-Height Gauge.

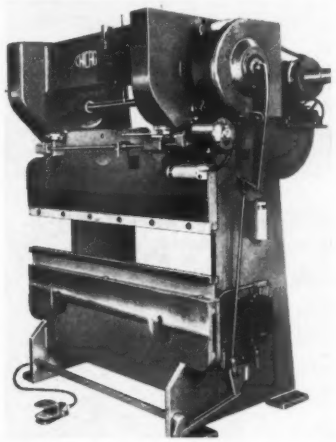
Write for illustrated circular and prices.

Exclusive distributor for U.S. and Canada:

CLEVELAND INSTRUMENT CO.
735 Carnegie Ave., Cleveland, O.

CIRCLE INFORM-A-GRAM KEY NO. 1323

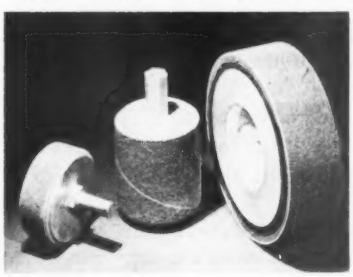
Press Brake Control. New Dreis & Krump automatic press brake controls increase production on all types of press brake work, eliminate whipping work and work spoilage due to kinking, and reduce operator fatigue to a minimum. Predetermined stops



provided greater safety for the operator. The unit consists of foot switch which replaces standard foot lever, solenoid for operating clutch, automatic switch box, and a control panel. Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago.
Circle Inform-A-Gram No. A51.

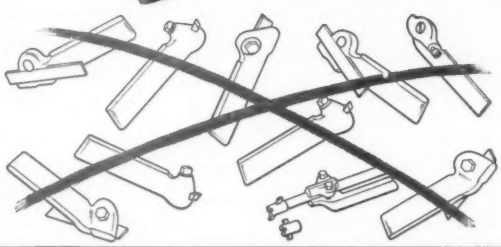
The Webber Heavy-Duty Gage Set contains all accessories necessary for a complete gaging system. Accurate to within 0.000004", the set contains fixtures which will assemble the blocks for use as dividers, scribers, and height or snap gages, in addition to their normal gaging function. These blocks can be assembled into almost any desired length without the use of accessories. Individual blocks are ½" to 1½" to insure maximum resistance to wear. For information, write to Webber Gage Co., 12899 Triskett Rd., Cleveland 11, Ohio.
Circle Inform-A-Gram No. A52.

Even-Cut Rubber-Cushioned Abrasive-Band wheels are now furnished in over 50 sizes, from ¼" diameter x ½" width to 6" diameter x 2" width. These wheels consist of a



plated alloy steel shaft with flanges holding a specially fabricated rubber wheel. Even-Cut Abrasive Band Co., 8212 Carnegie Ave., Cleveland.
Circle Inform-A-Gram No. A53.

ONE ALL-PURPOSE TOOL HOLDER INSTEAD OF TEN



ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading . . . Ideal for carbide tools . . . Bit sizes: ¼", 5/16", ⅜", 7/16", ½", ⅝".

Furnished with Cobalt Bits

ELK TOOLS, Inc.
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CIRCLE INFORM-A-GRAM KEY NO. 1331

REID QUALITY TOOL-ROOM ACCESSORIES AT MODERATE PRICES!

BALL HANDLES – Threaded
ROUND, OVAL, MUSHROOM PLASTIC AND ROUND STEEL

ROUND PLASTIC | OA OVAL PLASTIC | OB OVAL PLASTIC | MUSHROOM PLASTIC | ROUND STEEL

These are designed for machine tools, jigs, fixtures, shift lever handles, etc. and give your product that "dressed up" appearance. Made in a wide variety of diameters and thread sizes. Steel ball handles are turned from bar stock. Highly polished. Low prices and the finest quality.

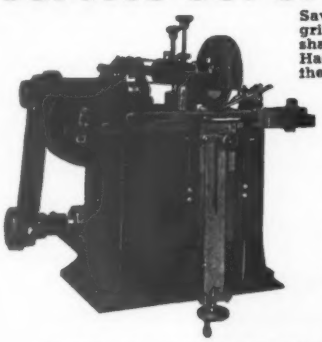
ALSO clamping handles, C.I. hand knobs, malleable machine handles, compression springs, hand wheels, spherical washers and many other accessories and components at low prices.

FREE! NEW 56 pg. CATALOG

REID TOOL SUPPLY CO. Muskegon Heights, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1332

Get three or four times More service out of hack saw blades



Savings in blade purchases alone can pay for this grinder the very first year. Instead of one or two sharpenings per blade the EC Combination Circular, Hack and Band Saw Grinder enables you to sharpen them five or six times before discarding.

The EC is a precision sharpener, the only grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. This unique feature enables operator to grind a variety of blades without dressing or changing wheels. Write for Bulletin.

WARDWELL MANUFACTURING CO.
3809 Ridge Rd. Cleveland 9, Ohio
MAKER OF LARGEST LINE OF SAW AND TOOL SHARPENING MACHINES

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Durably made of quality stock . . . simple and easy to attach . . . can be fitted to any die in 10 to 15 minutes. Adaptable to blanking, progressive or compound dies and can be used on strippers 5/16 inch thick and up. Works well on either right or left hand feeds—or with light or heavy material. Provides long, trouble-free performance.

Pays for itself after a few short runs

Automatic Stop individually packed with Trip Spring and Mounting Screws..... $2.50 each

Primary Stop..... $6.00 doz.

(Discount for quantity orders)

Automatic Stop

Cat. No.	A	B	C	D
9-11-6	3/16"	5"	5/8"	3"
9-21-6	1/4"	6"	3/4"	4"

Specify right or left hand

Primary Stop

Cat. No.	A	B	C
9-31-6	1/16"	3/8"	2 3/4"
9-41-6	3/32"	3/8"	2 3/8"
9-51-6	1/8"	3/8"	2 3/8"

For immediate delivery, specify size and mail orders to

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1341

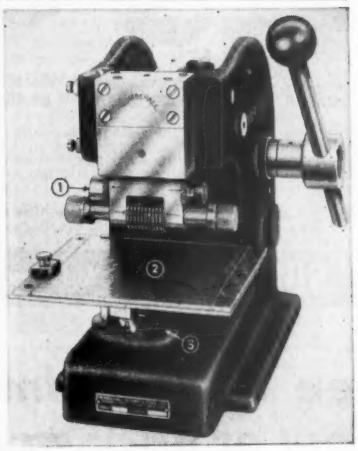
NEW

BENCH

NUMBERING

PRESS

MODEL 136



This new small, light, compact Press was designed for stamping small Name Plates and small flat articles with up to 1/8" high characters.

It weighs only 65 lbs. yet has the power and strength of a press much larger in size.

Its compactness, and small size, combined with its power, should be very welcome where saving of valuable space and leaving larger power presses free for other work is of importance.

The model 136 is hand operated, using a cam to obtain pressure. The fact that this press has only three moving parts makes it extremely easy to maintain.

Any Numbering Machine, automatic or non-automatic, Typeholders with interchangeable Steel Type, or Special Dies can be operated in this Press.

Write for bulletin TP-136

NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEN ISLAND 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1342

. . . Contour Projector, from page 68

side the bore and then light from the contour projector be allowed to enter, it will be reflected from the mirror to the bore surface, back to the mirror and then returned to the contour projector. In Figure 17 a clear image, though distorted, of the bore surface can be seen. The distortion, however, is circumferential with all radial distances remaining in their correct proportion. The concentric rings seen here are images of the two grooves while the space in between is the image of the spacing of the grooves.

As radial proportions are not distorted, the width of these rings is equal to the width of the grooves times the magnification; twenty times in this particular case. The distance between the rings is also directly related to the spacing of the two grooves so that it becomes simple to measure them on the projector.

Another application of the same principles can be found in the problem of checking a bar having four small radial holes instead of grooves when it is necessary to check these holes to see that they are located on right angle axes. When reflection from the 90° cone mirror is used exactly as with the grooves, the holes are located as required if the images are centered on the cross lines.

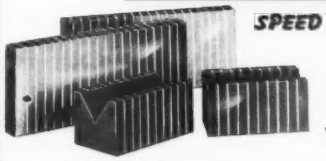
Just a word about making such a cone. The angle, of course, is 90°. It needs to be highly reflecting so that it should first be ground then chrome plated and polished. We sometimes make them of glass but either brass or steel is satisfactory if plated and polished.

A large number of difficult-to-reach measurements such as contours in deep recesses can be made by surface illumination. For example, if a part has a series of concentric recesses, it is possible to measure the sizes and concentricities of each by successively focusing on the steps using surface illumination.

I told you at the beginning of this discussion that I hoped to do three things. I wanted to show you the common uses of a contour projector for measurement. I have also shown you some rather unusual types of measurement problems to illustrate the versatility of the instrument as well as the ingenuity of others in adapting a contour projector to their needs. And, I have also tried to give you some tricks and kinks that may help you in using your own projector.

Let me now give you three reasons why I think a contour projector with a beam of light is the ideal way to make such measurements. It can be said very simply. A beam of light does not bend—it exerts no pressure on the work—and it does not wear out.

MAGNE-BLOX



SPEED SURFACE GRINDING SET-UPS WITH MAGNE-BLOX

Laminated Parallels
V-Blocks & Angle Irons

- Grind Work Square
- Grind Work Parallel
- Hold Round Pieces
- Save your Magnetic Chucks
- Eliminate Clamps
- Eliminate Holding Devices

UNIVERSAL SET Code GANBO In Case $22.25

Write for Folder—Code GINXA

RADIUS DRESSER

SPEED UP PRODUCTION with the "Little Wonder" RADIUS DRESSER

Dressing and Shaping Grinding Wheels up to 1" Convex or Concave Without Diamond - Code GANLE $39.50

Natural Pointed 1/3 K. Diamond $6.50

Better Support by using Swinging Arm pivoted on Lapped Centers, eliminating Vibration and giving Better Finish.

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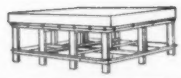

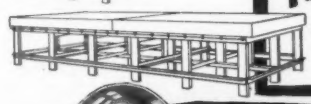

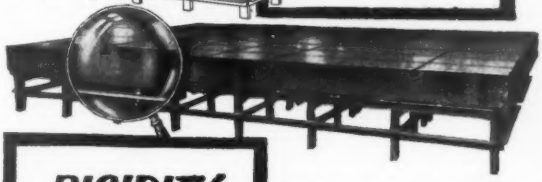

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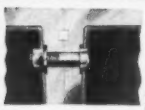
RIGIDITY OF ONE-PIECE MOUNTING

CHALLENGE LAYOUT SURFACE PLATES

Precision ground or planer finished, Challenge semi-steel Layout Surface Plates provide a true, rigid surface for layout, inspection or assembly work. Plates can be grooved and keyed so that two or more can be mounted into one large complete unit. Write for new Challenge catolog.



Close up view showing how plates are bolted and keyed to insure a flat surface of unyielding strength. Available with grooving, scoring, or "T-Slots." 6" thick plates in 16 standard sizes - other sizes to order.

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Office, Factories and Show Room
GRAND HAVEN, MICHIGAN

Challenge
TRADE-MARK. ®

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FREE BULLETIN on SURFACE ROUGHNESS tells . . .

- **How to establish roughness specifications** for parts that are in production — and for parts of new design.
- **How to show roughness specifications** on drawings and shop prints.
- **Practical advantages** of surface roughness specification.

ALSO gives tips on MEASURING surface roughness in the shop—and briefly tells why most plants use the PROFILOMETER for doing this.

Write Today!

Ask for BULLETIN L21.

Profilometer is a registered trade mark.

MMCo
MICROMETRICAL MANUFACTURING COMPANY
345 S. MAIN ST. ANN ARBOR 14, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1353

BARNES HACK SAWS — BAND SAWS BARNES

BARNES ROCKET

POWER and HAND HACK SAWS ARE IN DEMAND FOR PRODUCTION CUTTING

GRADIENT HARDNESS

BARNES

1. HIGH SPEED STEEL
2. FLEXIBLE—TOUGH
3. SAFE—SHATTER-PROOF
4. MEETS EVERY SHOP TEST
5. FOR ALL-PURPOSE CUTTING

W. O. BARNES CO., INC.

1287 TERMINAL AVE., DETROIT 12, MICH

CIRCLE INFORM-A-GRAM KEY NO. 1354

MEN YOU SHOULD KNOW

John Lawrence has been elected Executive Vice President of the Joy Manufacturing Company in Pittsburgh, Pa. Previous to joining Joy in 1951, Mr. Lawrence was associated with SKF Industries for seven years and Jones and Lamson Machine Company for 10 years.

◆

The appointment of **Robert E. W. Harrison** as Director of Special Engineering Projects for Sintercast Corporation of America has been announced.

George H. Elliott, senior partner of George H. Elliott & Co., of New York, management consultants, has been elected Chairman of the Board of the Research and Development Corporation of America. Also, **Orlo A. Ewing,** until recently Manager of Manufacturing at Corry-Jamestown, maker of metal office furniture, was elected President of Research and Development Corporation of America. RDCA provides various industrial research services including mechanization and automation.

The appointment of **Harold Wrigley** as Works Manager and **Charles S. Basney** as New Products Manager of the Barry Corp., was announced recently by company President Ervin Pietz. Mr. Wrigley joined the Barry Corp. in 1951. He served as Plant Superintendent at that time. Mr. Basney will serve as a direct assistant to Mr. Pietz in finding and evaluating new products for manufacture.

◆

The appointment of **James P. Steibel** as Manager of Research and Development and **Logan H. Cashmen** as Purchasing Agent was announced recently by Dumore Precision Tools, Racine, Wisc. Mr. Steibel served as Methods and Products Engineer since joining Dumore in 1944. His latest project was the design and development of the Dumore Automatic Drill Unit. Mr. Cashmen held positions of Cost Accountant and Office Manager since joining the company in 1942.

◆

Edward C. Hamm has been named Vice President and Director of Sales of the Colson Corporation of Elyria, Ohio. **Since 1946 Mr. Hamm** has been President and General Manager of the Service Caster & Truck Corporation of Albion, Mich., and Somerville, Mass. The assets of that company were recently acquired by the Colson Corp.

◆

Chambersburg Engineering Co. announces the appointment of **C. D. Galloway, Sr.,** as special consultant on automatic handling systems for the Chambersburg Impacter forging hammer. Mr. Galloway was employed for 34 years by the Electric Storage Battery Co. in Philadelphia and at the time of his retirement in 1951 was Factory Engineer for all plants. He is currently retained by the Electric Storage Battery Co. as adviser on mechanical processes.

◆

Two executive personnel changes are announced by The Gear Grinding Machine Co., Detroit. **Herbert S. Ries** has been elected President of its newly purchased subsidiary, the Republic Gear Co., Detroit, and **Edgar D. Leon** has been elected President of Gear Grinding's subsidiary, Detroit Bevel Gear Co.

◆

David C. Verson, President of Verson Allsteel Press Co., Chicago, has announced the appointment of **Paul Kjelstrom** as Manager of the Service and Parts Division of the company. **Jack Steinhardt** has been appointed Assistant Manager, Service and Parts Division of Verson.

CIRCLE INFORM-A-GRAM KEY NO. 1361

MEN YOU SHOULD KNOW

Appointment of **Clayton L. Jones** as Master Mechanic has been announced by M. V. Durkin, Vice President-Manufacturing, Morse Chain Co., a Borg Warner industry. Mr. Jones was formerly Vice President-Manufacturing for the Hage Industrial Corp., Toledo, and Master Mechanic and Superintendent for the Bradford Machine Co., Cincinnati.

◆

At a recent stockholders meeting, National Tool Company of Cleveland added two top officers to the Management Staff. **Raymond D. Lindstrom** was elected Vice President of Manufacturing; and **Joseph B. Clough** was chosen Vice President of Sales.

◆

James H. Moore is now General Manager of Vacuum Metals Corp., with General Offices in Syracuse, N. Y. In announcing Mr. Moore's appointment, Vacuum Metals' President Richard S. Morse stated that all vacuum melting production facilities formerly operated by National Research Corp. and Crucible Steel Co., in Cambridge, Mass., are being moved to Syracuse.

◆

William F. Wilson has been appointed Vice President in charge of Engineering and Manufacturing of the Gear Grinding Machine Co., Detroit. Formerly the company's Works Manager, Mr. Wilson will be in charge of all engineering and manufacturing operations for all company divisions.

◆

Two organization changes in the top management group have been announced by the Jones & Laughlin Steel Corporation. **A. A. Archibald** has been named Vice President, Engineering and Plant; and **F. T. Barton** has been appointed Vice President, Special Products and Services.

◆

Appointment of **Carl J. Meister** as Vice President – Sales of the Atkins Saw Division of Borg-Warner has been announced by Stanley J. Roush, Divisional President. Mr. Meister was formerly Vice President and Director of Sales for the Atlas Chain and Manufacturing Co.

◆

At the annual meeting of the Board of Directors of the Barnaby Manufacturing Co., Inc., Bridgeport, Conn., **Marc Bendick** was elected President, succeeding Barnabus Toth, retiring active head of the firm. Also elected were **Jack Stock,** Treasurer; **Louis F. Kutscher,** Sales Manager; and **Harold Saunders,** Superintendent.

Heinz Pagels, newly appointed General Manager of Virginia Metal Products' manufacturing division, a subsidiary of Chesapeake Industries, will now be in charge of all engineering and manufacturing of VMP Mobilwalls, doors, and bookstacks.

◆

L. C. Schweitzer has been named Assistant General Manager of the Ohio Crankshaft Company's TOCCO Division. Mr. Schweitzer was formerly Chicago District Manager for TOCCO.

Heber L. Newell, former General Manager of the Barrett-Cravens Co., Chicago, recently took over the post of Assistant General Manager of The Denison Engineering Co., Columbus, Ohio.

◆

Harry H. Rose, General Manager of the Simmons Fastener Corp., Albany, N. Y., has been elected Vice-President and Director of the firm. Mr. Rose will continue as General Manager, a position he has held since 1949.

With a Dake Press, lift truck tires can be changed right in your plant

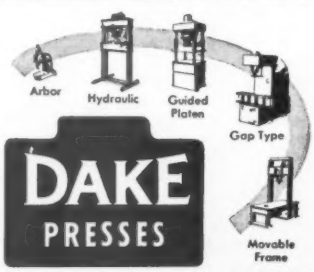
No need to carry an inventory of spare lift truck wheels in different diameters and widths! With a Dake Hydraulic Press you need only tires and rims which can be pressed on and off in your own plant.

This not only means lower investment and reduced service time, but it brings additional savings from being able to buy tires direct from a mill supplier.

The Dake customer pictured above says his Dake Press pays its way on tire service alone . . . and he uses it in addition for many plant maintenance operations – such as pressing in bushings, pressing off frozen sprockets and gears, and straightening plate steel for briquetting presses.

Have you stopped to think what a Dake Hydraulic Press could do for YOU? Send for illustrated Catalog 129.

Dake Engine Company, 634 Seventh St., Grand Haven, Mich.



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634 Seventh St., Grand Haven, Mich.
Please send me a copy of Dake Catalog No. 129
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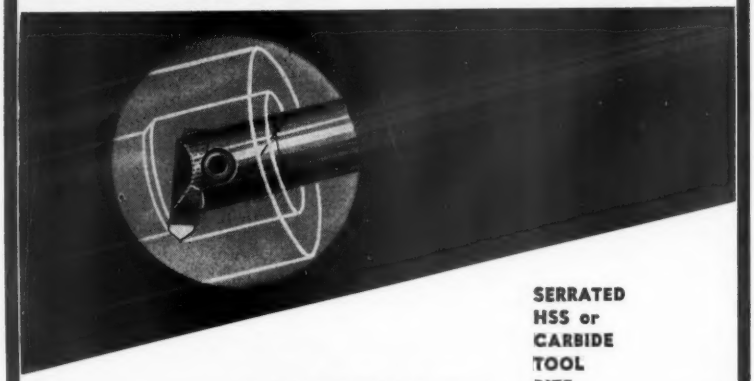
CIRCLE INFORM-A-GRAM KEY NO. 1371

Newest Development in Precision Boring Tools



SERRATED HSS or CARBIDE TOOL BITS

NEW "BH" BORING BARS
overcome the major disadvantages of conventional bars:

- Both clamp and insert are serrated to insure the firmest grip possible, even with little pressure on the clamp.
- New advanced clamp design eliminates strain on the inserts and prevents breakage of tool bits.
- Carbide and HSS inserts have a half-elliptical shape for better side clearance and more strength, less chatter.

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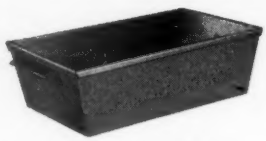
Toronto 18, Ontario

R. B. TOOL Co., Inc. 785 North Broadway White Plains, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1381



LUCAS TOTE PANS

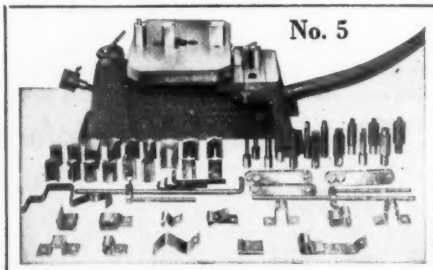
HELP SOLVE PRODUCTION PROBLEMS!

Lucas Tote Pans are built for long wear and ease of handling. Designed for every shop use—storing materials, holding parts for convenient handling by machine operators and at assembly lines, Lucas Tote Pans are available in nesting type, stacking type, straight side and assembly or bench pans. Lengths from 10" to 32", widths from 5" to 23" in standard sizes. Other sizes made to your specifications.

For Further Information, Write

J. L. LUCAS & SON, INC. Bridgeport 5P, Conn. Tel. CLearwater 9-3393

CIRCLE INFORM-A-GRAM KEY NO. 1382



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BENDER-CUTTER
CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛"x1½" as illustrated. Punching and round end blanking dies available. Other models up to ¼"x4" air operated.

ALSO AIR OPERATED MODELS.

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J. A. RICHARDS CO. KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1383

THREE FEATURES MAKE SCREWMATIC OUTSTANDING

The Screwmatic 750, a unit-designed automatic single spindle screw machine, has three features that, in terms of lower costs and high speed production, make it one of the most advanced manufacturing units in modern industry.

An infinitely variable spindle speed drive replaces gearing on the machine, permitting a maximum spindle speed of 5100 rpm's, with higher speeds available on request. This is especially important in carbide tooling.

The second feature of the new design is the V-belt work spindle drive in place of roller chains. An independently supported V-belt sheave drives the spindle by means of a clearance spline.

Thirdly, stock feeding is by means of low pressure air cylinders instead of a constant speed backshaft.

Using standard size collets and feeders, this new screw machine takes bar stock up to 0.750" in diameter. A standard 7" cam is used when turning 2¼" stock lengths. With larger cams it is possible to turn lengths up to 6".

The over-all design of the Screwmatic 750 provides facilities for all commonly used attachments without obstructing tool accessibility or the free flow of chips.

For additional information, contact The Gear Grinding Machine Co., 3901 Christopher, Detroit 11, Mich.

Circle Inform-A-Gram No. D1.

ONLY $295.00
COMPLETE WITH 1/3 H.P. MOTOR

BARKER
IS YOUR BEST BUY in a BENCH MILL

Just

√ Check the price
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Special Accessories on model shown here available at slight extra cost.

Hundreds of Barker mills in operation and not one complaint. It's a pretty strong statement, but true.

Every BARKER is precisely and sturdily built. A "work horse" on any bench.

Today, BARKER MILLS are performing various machining operations in hundreds of diversified industries, large and small.

Rather than attempt to tell all here, we'd like to mail you the "BARKER" story with complete information on specifications, operational features, special accessories and the list of many users, many doubtless in your particular field.

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CIRCLE INFORM-A-GRAM KEY NO. 1391

LEITZ OPTI-COMPARITOL

An amplifying gage of semi-optical design for gaging outside dimensions, lengths and thicknesses precisely and rapidly.

Its unusual design makes it sensitive enough for the finest tool and gage inspection, with the necessary ruggedness for fast, day in - day out - production inspection.

Brightly illuminated screen makes the readings unmistakable at a glance. Adjustable red tolerance shield shows undersize pieces and green tolerance shield shows oversize pieces.

If it's White - It's Right

Reads in .00005" - Range ± .005" Capacity 6"

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Geo. SCHERR OPTICAL TOOLS, Inc.
200-T **LAFAYETTE STREET • NEW YORK 12, N.Y.**

CIRCLE INFORM-A-GRAM KEY NO. 1392

PRECISION-FINISH YOUR OUTSIDE DIAMETERS
The Odee-HONE

★ ACCURATE
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★ LIGHTWEIGHT

Corrects out-of-roundness, waviness, chatter . . . Generates diametric size within .0001" tolerance . . . Hones all parts from ½" to 2½" in diameter—regardless of length or material . . .

Can be used on any lathe, drill press, electric drill . . .

Simple to set up and operate—no aligning, fixturing or wheel dressing is necessary . . .

Removes a few "tenths" or a few "thousandths" stock in less time than it takes to re-center, indicate a part, and dress an abrasive wheel.

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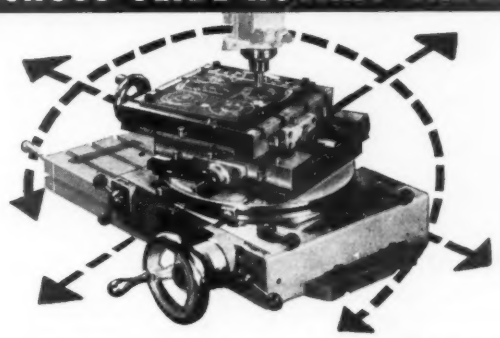
CIRCLE INFORM-A-GRAM KEY NO. 1393

ADVANCE
CROSS-SLIDE ROTARY TABLE



CUT Set-Up Time Cost As Much As 90%*

Make multiple radii and angle milling cuts accurately with only ONE set up! On your standard vertical mill, equipped with ADVANCE Cross-Slide Rotary Table, you can make all such cuts without re-clamping work. Size of radius you can cut is limited only by milling machine table movement. Ideal for molds, dies, patterns, etc.

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BUSHING BONDING CEMENT

For Retaining Drill Jig Bushings Use B-K 7 # CEMENT

No distortion of the jig plate or misalignment of the hole pattern. Eliminates lapping of press fit bushings after assembly. Not affected by drilling heat. Bushings can be retained in steel, aluminum or fiberglas jigs. Easily applied by untrained personnel. Especially recommended for use in "master tooling" operations.

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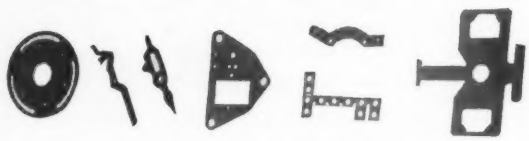
CIRCLE INFORM-A-GRAM KEY NO. 1401

STAMPINGS---SHORT RUNS



A dependable service for small quantity requirements for new developments and production up to 50,000 pieces. QUICK DELIVERY — ACCURACY — backed by 23 years' experience.

Linden 3-4100 **SMALL LOT STAMPING CO.**
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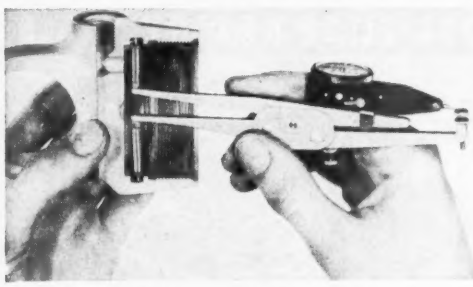
INDI-CAL (Indicator-Caliper) "O" RING & BORE GAGE



Fills a long felt need for a practical, low-cost dial bore gage. INDI-CAL offers these features:

- Sturdy Construction
- Micrometer Adjustments
- Spring loaded
- Satin finish
- Range .400" to 6" or larger
- Special points available
- Adaptors for "Last Word", "Gem", and other indicators @ $1.

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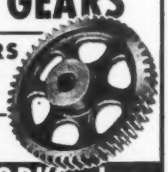
INDI-CAL (.600" to 2⅝") w. case **$11.95**

CIRCLE INFORM-A-GRAM KEY NO. 1403

DO IT WITH **ATLANTIC GEARS**

SPUR • SPIRAL • WORM • BEVEL GEARS GENERATED WITH PRECISION ON MODERN EQUIPMENT



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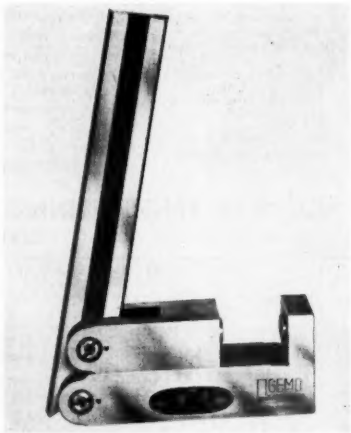
Call CAnal 6-1440 **ATLANTIC GEAR WORKS, Inc.**
200 - T Lafayette Street • New York 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1404

NEW BEVELGAUGE IS ACCURATE TO ± 1 MIN

The Gemo Bevelgauge can be used for making and checking angular setups to ± one minute of arc wherever high-precision angle-measuring is required.

This gage consists of base, slide that moves along the base, and angle bar. The angle bar is attached to the base and to the slide by pivots, as shown. The angular setting of the angle bar is determined by the position of the slide along the base, and the position of the slide is governed by gage blocks placed between facing anvils on the slide and base.



A standard 37-piece set of gage blocks provides for settings from 0° to 180°, in increments of one minute of arc.

The slide is clamped by a knurled nut in the base, and the angle bar is clamped by a nut in each pivot.

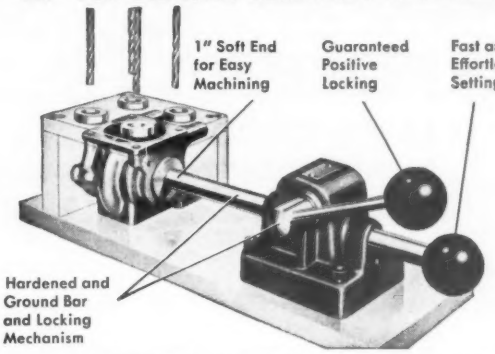
Two angle bars are furnished with the unit: a 7" straight bar, as shown, for angles from 45° to 135°; and a 4" dogleg bar with 45°, for angles from 0° to 45° and 135° to 180°. The bars are interchanged by loosening the pivots, and can be positioned lengthwise as desired.

Further details, including set-up instructions, are given in Bulletin 543, available from Cleveland Instrument Co., 735 Carnegie Ave., Cleveland 15, Ohio.
Circle Inform-A-Gram No. D2.

BUY U. S. SAVINGS BONDS

HEINRICH "GRIP-MASTER" FIXTURE LOCK NOW AVAILABLE IN TWO TYPES

- "SV" STANDARD
- "PA" FOR USE WITH COMPRESSIBLE MATERIALS


1" Soft End for Easy Machining
Guaranteed Positive Locking
Fast and Effortless Setting
Hardened and Ground Bar and Locking Mechanism

CUT TOOLING COST—SPEED WORK

Standard "SV" Model features the famous instant-acting, effortless locking mechanism used successfully in industry for nearly 10 years in drilling, milling operations. Now a special "PA" Model permits pumping jaw forward for holding *compressible materials* with a positive grip that hammer blows cannot break! Pays for itself in cutting tooling costs up to 75%! See your Dealer or write for details.

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DRILL PRESS VISES • FIXTURE LOCKS • NIBBLERS PUNCHES • ROD CUTTERS

CIRCLE INFORM-A-GRAM KEY NO. 1411

Solves any eyeleting problem!

Edward Segal AUTOMATIC EYELET ATTACHING MACHINERY

Model NR Bench Type *(Illustrated)* Stroke 2¾". Depth of throat (end ram to frame) 7¾". Adjustable horn provides ample space for special feeds, fixtures and indexing mechanisms.

Model XNR same as above for hand-feed staking operations, 1½ & 2 ton capacity.

Whatever the size and the materials there's an Edward Segal precision-built machine to do a cost reducing, time saving job on your eyeleting assembly . . . For single or multiple settings. Interchangeable raceways, rams and tool holders give these machines amazing versatility. In constant use in hundreds of plants in all fields.

Submit your specs to us for analysis without obligation, and write for our interesting booklet loaded with eyelet setting data — Bulletin M 71

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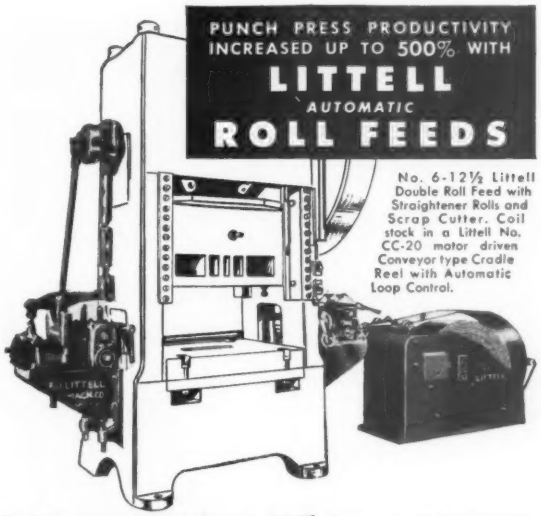
EDWARD SEGAL EYELET ATTACHING MACHINERY SPECIAL HOPPERS AND FEEDING DEVICES

CIRCLE INFORM-A-GRAM KEY NO. 1412

PUNCH PRESS PRODUCTIVITY INCREASED UP TO 500% WITH LITTELL AUTOMATIC ROLL FEEDS



No. 6-12½ Littell Double Roll Feed with Straightener Rolls and Scrap Cutter. Coil stock in a Littell No. CC-20 motor driven Conveyor type Cradle Reel with Automatic Loop Control.

Production per press increases up to 500% when automatic feeding with Littell Roll Feeds replaces hand feeding. The savings in handling and storage of coil stock added to the economies of faster production produce an automation dividend. Littell Roll Feeds in a wide range of sizes and models handle stock up to .156" maximum thickness and up to 72" maximum width at speeds of 50 to 250 strokes per minute. Lengths fed per stroke range up to 50". Standard Littell Automatic Feeds serve all types and sizes of presses. ***WRITE FOR THE LITTELL ROLL FEED CATALOG***

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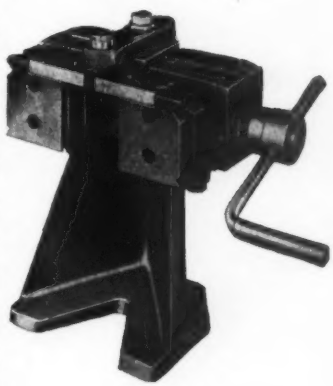
CIRCLE INFORM-A-GRAM KEY NO. 1413

"JOHN'S" UNIVERSAL DRILL JIG

Minimizes Tooling - - - Increases Production



For cross drilling or end drilling round, hexagon, or square stock or standard or odd shaped castings from ⅛" to 8" O.D. the self-centering "JOHN'S" Drill Jig cuts tooling and production costs to minimum for 10 to 100,000 pieces. Standard removable slip fit bushings and holders available to drill center or mean off-center holes from #60 to 1-1/32" drill. Special bushing holders for multi-drill operations easily tooled. The self-centering action will hold within .0015" or better regardless of jig wear or piece part O.D. variation. Ideal for holding rough castings. Working jaws that hold part, and bushing holders, can be doweled to provide any number of permanent drill jigs from one jig. Bases available for mounting jigs from 1" to 18" off working surface. Handles reversible; can be put on either side of jig. Can also be used with floating jaws for outside location points. Jigs available in three sizes 6", 8", 14", jaw openings 2½", 3¼", 7½". For information on hundreds of uses for jig or tooling recommendations for specific job, write:

HEUSER MANUFACTURING CO.
1638 N. Paulina St., Chicago 22, Ill.

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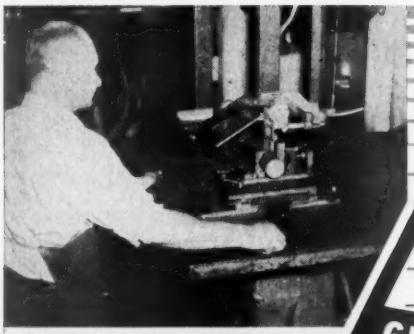

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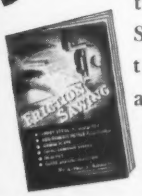
HIGH SPEED BAND SAWS

GREATEST COST SAVER IN METAL CUTTING

Write for your free copy of "FRICTION SAWING" and get hep to the fact you can save thousands of dollars and much valuable time by friction sawing with Tannewitz High Speed Band Saws: Sheets of both hard and soft steel, formed or flat; trimming of malleable and steel castings; 1" armorplate and other materials. Write for the "FRICTION SAWING BOOKLET", right NOW!



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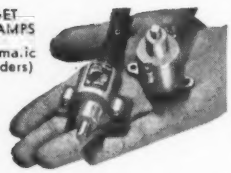
SAWING MACHINERY SPECIALISTS

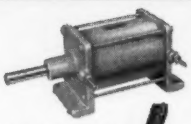
The TANNEWITZ WORKS GRAND RAPIDS MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1421

Suggestions for **FASTER CHEAPER PRODUCTION**

MIDGET AIR CLAMPS (Pneumatic Cylinders)





AIR CYLINDERS

WORK FEEDERS

AIR VISES

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Engineers!
Production Men!
Purchasing Agents!

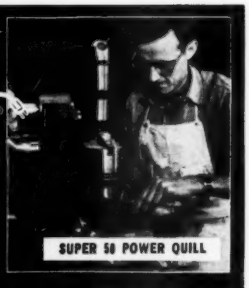
You will find many valuable suggestions for speeding work, saving your plant time and money in this lavishly illustrated Mead Air Power Catalog! Get your copy. See how Mead-designed air operated devices can be assembled to form low-cost automatic or semi-automatic production set-ups! Write today.

MEAD SPECIALTIES COMPANY

4114 No. Knox Ave., Dept. HA-124, CHICAGO 41, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1422

Precise **LOWEST COST PRECISION FOR TOOL ROOM AND PRODUCTION**



UP TO 45,000 R.P.M. AND ⅛ H.P. ON AC/DC. Only PRECISE has the speed, power and precision needed to turn *Tungsten Carbide Mills* as well as all other rotary tools with shank diameters to ¼". Grind, mill, finish, polish any material from wood to the hardest alloy steel. MODELS SUPER 30 and SUPER 40 are for hand applications or machine set-ups; PRECISE SUPER 50 is for heavy duty in machine set-ups. Precision quills and chucks; lifetime-lubricated, micro-precision bearings; machined metal housings. Mounts and accessories for each model extend versatility on standard machine tools.

New

PRECISE SUPER 30 45,000 R.P.M. and ⅛ H.P. in 35 oz. Draw collet.

Write FOR CATALOG

PRECISE PRODUCTS CORP. 1341 Clark St., Racine, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 1423

Kaiser Aluminum & Chemical Sales, Inc., announces the appointment of **Leroy S. Young** as Assistant District Manager of its Detroit Sales Office. Mr. Young will assist **M. C. Crockett,** District Manager, in supervising sales activities of the district, including a branch office in Grand Rapids.

◆

The newly appointed Cushman Chuck Co. Representative in Southern New Jersey, Delaware, and Virginia, is **W. H. Jones,** Wallingford, Pa.

◆

Recently announced by **James A. O'Grady,** President of Weldaloy Products Co., was the appointment of **George W. Staiger** as the company's Ohio and Western Pennsylvania Representative. Mr. Staiger will make his headquarters in Cleveland.

◆

G. E. Montgomery is now at his new post of Michigan District Engineer for the Burdett Manufacturing Co. of Chicago, industrial gas-fired ovens and finishing equipment builders.

◆

Clifford E. Otto has been named metropolitan New York District Manager for "Tru-Cast" beryllium copper mold components, manufactured by Manco Products, Inc.

◆

Louis S. Kutscher has taken over as Sales Manager for the metal working tool, record dies and accessories, railway gages, hardware, and special equipment divisions of the Barnaby Mfg. Co.

◆

Gorham Tool Co.'s exclusive representative in the Chicago area is **Virgil Fortner.** In his new capacity, Fortner will handle the complete line of Gorham standard cutting tools and provide Chicago manufacturers with specialized cutting tool engineering service.

The Gairing Tool Co. announces the appointment of **B. E. Logsdon** as Sales Engineer on Machine Tool Applications and Special Assignments, working from the company's office in Detroit.

◆

Charles E. Windhovel, Jr., has been appointed Sales Representative for Vanadium-Alloys Steel Co. in the Central New York State area, working out of the company's Buffalo office.

Charles E. Vanderpool is now Sales Manager for the Rotor Tool Co., Cleveland. Mr. Vanderpool joined the company in 1947 as Sales Promotion and Advertising Manager.

◆

Randolph E. Bailey and **Robert P. Marks** have been appointed to the Sales Engineering Staff of the San Joe Div'n, E. W. Bliss Co. Both men will represent The Die Supply Co., a Bliss subsidiary.

SPECIAL INTRODUCTORY UNIT

WHISTLER
10 HOLE MAGNETIC PERFORATING DIE

Cut die costs drastically, start production quicker. This M-12-14 Complete Introductory Unit includes a set of blank templates, ten punches, dies, strippers and punch and die retainers complete to make up a ten hole precision perforating die. Any diameters from 1/8" to 1/2" to your selection. Catalog illustrates additional re-use economies.

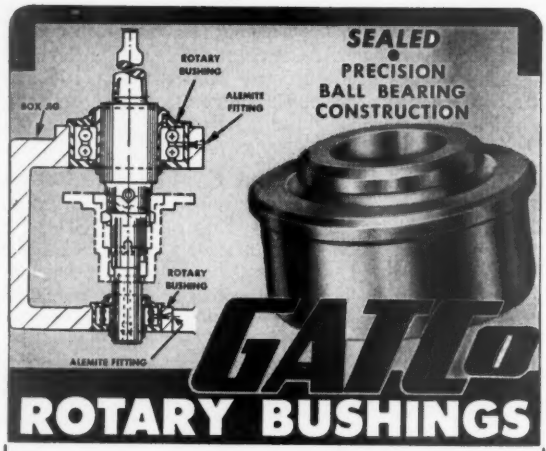
$675
NET F. O. B. OUR PLANT

WHISTLER DIES
ARE CUTTING COSTS
FROM COAST TO COAST

SEND FOR CATALOG Illustration shows how quick and simple it is to set up a Whistler Magnetic Perforating Die ready for production. Larger standard units can be added to suit your requirements.

S. B. WHISTLER & SONS, INC.
Manufacturers of Adjustable, Magnetic and Custom Built Dies for All Industry
748 Military Road Buffalo 23, New York

CIRCLE INFORM-A-GRAM KEY NO. 1431



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AND

FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear —Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.

42322 ANN ARBOR RD., U. S. 12, PLYMOUTH, MICH.

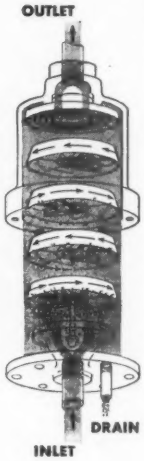
Telephone PLYMOUTH 1472

CIRCLE INFORM-A-GRAM KEY NO. 1441

EQUIPMENT LASTS LONGER
...PERFORMS BETTER...
when the

ARIDIFIER

SCRUBS, CLEANS AND DRIES
On Air and Gas Lines



LASTS LONGER because...
The Aridifier's patented centrifugal-baffle action traps 92% of all dirt, oil, scale and water in gas or compressed air . . . and drains off these troublemakers *before* they can damage tools and equipment.

PERFORMS BETTER because...
The Aridifier protects tools against the freezing, fouling, caking and corrosion caused by dirt and foreign matter . . . assures the clean, dry air and gas that means better spray work, painting, lacquering, sand blasting, air cleaning, and similar operations.

Easily installed, the Aridifier maintains itself. 10 models. Capacity range; 7 CFM to 17,000 CFM.

Learn HOW the Aridifier scrubs with a patented centrifugal-baffle action.

Write for This Catalog Now!

Logan **ENGINEERING CO.**

4923 W. LAWRENCE AVE., CHICAGO 30, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1442

for easier

FASTER LOCKING

of threaded fasteners at lower cost!

The Gripco Lock Nut one-piece design gives a tighter more positive holding action for faster application at less cost. And for 50 years the Gripco locking feature has proven itself by an ever increasing use. All-one-piece to cut initial cost—(no inserts, outside devices or complicated features)—the extreme holding or locking action is produced by a simple, vertical thread deflection. For stress, wear or vibration, a Gripco Lock Nut will hold tighter, wear longer. Impervious to oil or water. Write for samples and full details.

GRIPCO PRODUCTS INCLUDE:

Gripco Lock Nuts, New Gripco "Clinch" Nuts, Gripco Hi-Nuts, Gripco Pilot-Projection and Countersunk Weld Nuts with or without Gripco locking feature.

103

GRIP NUT COMPANY

"after 50 years still holding strong"

308-W S. MICHIGAN AVE., CHICAGO 4, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1443

GROWING PAINS

A highlight of **Eastman Mfg.'s Co.,** Fortieth Anniversary year will be the erection of a new 50,000 sq. ft. modern manufacturing plant in Manitowoc, Wisc. The new one-story plant will represent an increase of 20,000 sq. ft. of space, housing manufacturing, research and development, and office departments.

◆

Flex-O-Tube Div'n of Meridan Corporation announces that it has completed its move and is in production in its new half-million dollar plant in Inkster, Mich.

◆

The Colson Corp. has begun work on a 40,000 sq. ft. plant one and a half miles from the company's main plant in Elyria, Ohio. The additional factory space, according to President Robert A. Pritzker, will be devoted to the production of industrial trucks.

◆

Jansson Gage Co. has moved into its new plant in Detroit, marking the occasion with an expanded line of products and the addition of new and finer measuring instruments to the company's line.

◆

An "open house" marked the completion of the **Zero Manufacturing Co.'s** new 10,000 sq. ft. addition in Burbank, Calif. This addition will provide space for final operations, inspection, and storage of drawn metal boxes. The company supplies electronic sheet metal components to East and West Coast manufacturers.

◆

The production capacity of the **Hitchiner Manufacturing Co.,** Milford, N. H., will be increased by 50% following the completion of a plant expansion program. Most of the new floor space will be used by the die making department of this investment casting firm, but some of the addition will be used for a vault for storing valuable dies.

Addition of a new air-conditioned building to the Trenton, N. J. plant of **Ajax Electrothermic Corp.,** represents almost a 50% physical expansion of the company's engineering and administrative departments.

◆

Sahlin Engineering Co. announces the opening of their new plant to house automatic research and experimental activities in Birmingham, Mich.

Built to serve the South with steel, **Solar Steel Corp.'s** new completely equipped steel warehouse plant in Nashville has opened its doors for business.

◆

This fall marks the construction of a 156,000 sq. ft. addition to the **Ford** Engineering Staff administration building in Dearborn, Mich. The new extension, to be occupied late next year, is part of a multi-million dollar expansion program.

Checks Dimensions to HALF-MILLIONTHS!

THE HALF-MILLIONTHS MICRO-AC Electronic Microcomparator is for gage room use and ultra-precision production gaging. It reads .0000005" or .000001" per scale division, either side of center zero — on continuous linear scales, used interchangeably at will. Other sensitivities can be provided for the less-sensitive scale to meet specific requirements.

Frictionless gage-head movement and drift-free amplifier assure *consistent repeat readings.* Other features include fast meter response; easy-to-read scales (half-millionths divisions are 1/10" apart); low contact pressure; and quick set-up.

OTHER CLEVELAND GAGES with the same basic advantages are the PAR-AC Electronic Production Gage and INDI-AC Electronic Indicator. These permit *recording the readings.* The gage heads are often used with *special fixtures,* and for automatic gaging.

WANT DETAILS? Write for 12-page Bulletin 542.

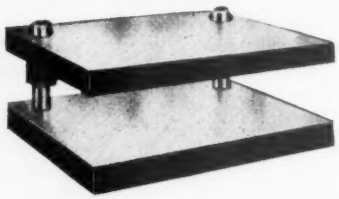
***BEST? Ask the USERS. Names on request.**

Designed, developed and manufactured by

Cleveland INSTRUMENT CO.

735-3 CARNEGIE AVE. CLEVELAND 15, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1451



Diemakers Products, Inc., a *new* company owned and operated by those who have had many years experience in the production, sale and distribution of diemakers supplies, proudly presents a *new* line of die sets.

These standard die sets are carried in stock for immediate delivery. Die space from 12½ x 6 inches to 25 x 14 inches, with three (3) different thicknesses of shoes and punch holders. Inserted shanks can be furnished.

A complete line of Leader Pins and Bushings, including Shoulder Pins, are also carried in stock.

Special Leader Pins and Bushings, to your specifications.

Steel Die Sets, other than those listed standards, can be furnished.

Steel plate, ground or in the rough, available from ½" to 12" thick, cut to shape.

Catalogue on Request

DIEMAKERS PRODUCTS, Inc.

2177 West 28th Street • Melrose 1-3434 • Cleveland 13, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1461

BRAND NEW

VERTICAL-HORIZONTAL-BASE

DE-STA-CO TOGGLE CLAMP

with low silhouette the fixture-hugger that makes it far easier to insert and remove work . . .

and complete clearance of working area due to flop-over holding bar—ideal for positioning metal or plastic sheets!

Send for FREE CATALOG on the new DE-STA-CO Models 507 and 509

DE-STA-CO DETROIT STAMPING COMPANY

World's FIRST Line of TOGGLE CLAMPS

344 Midland Avenue • Detroit 3, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 1462

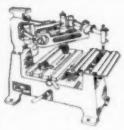
WEST COAST OFFERS ENGINEERING AND MANAGEMENT COURSE

The College of Engineering and the School of Business Administration of the University of California is offering the first Engineering and Management Course on the Pacific Coast. It is to be held at the University from January 31 to February 11, 1955 and will be of interest to operating management personnel.

A full range of subjects is on the schedule including elementary concepts of management and motion-study, advanced concepts of linear programming and electronic data processing, wage administration, production and quality control, automation, plant layout, and materials handling, to name a few.

Members of the teaching and research staff of the University as well as men prominent and well-versed in their particular fields of industry will be the instructors.

Preceding this course by two days will be the Seventh Annual Industrial Engineering Institute sponsored by the University Extension.



ENGRAVE RAISED or SUNKEN LETTERING AND DESIGN

*PANTO Model UE-3 Engraver

On METALS, STEEL, PLASTICS and other MATERIALS

*Trade Mark Reg. U. S. Pat. Off.

PANTO

Write for bulletin B-1

H. P. PREIS ENGRAVING MACHINE CO.

647 U. S. Route 22 Hillside, N. J.

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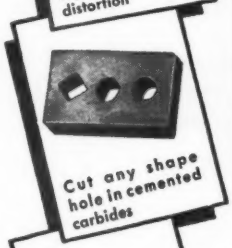
The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: ½ — $1.36; ⅜ — $1.36; ⅝ — $1.58; ⅞ — $1.89. Write for price list

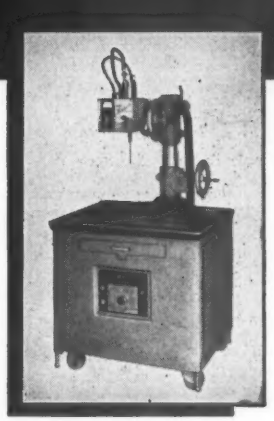
THE O K TOOL COMPANY, INC., Milford 8, N. H.

CIRCLE INFORM-A-GRAM KEY NO. 1464

METAL DISINTEGRATION

and what it can do for you





Literally hundreds of thousands of dollars are saved annually by corporations that are using Metalmasters in just tool and die repair alone.

There's a technical engineer in your area to give you an on-the-spot demonstration in your own plant at your convenience. (NOTE: It is not uncommon to pay for a Metalmaster with just one short demonstration through savings on workpieces.

There's a Metalmaster designed for your operation and priced to fit your needs. For information as to the many uses and benefits Metalmaster can offer you, write today on your company letterhead to:

Metalmaster
DIVISION OF CLINTON MACHINE COMPANY
CLINTON, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1471

MERRY CHRISTMAS ★ HAPPY NEW YEAR

May your Holiday Joys be Multiplied!

★ With our customers and friends we want to lay aside business cares for the moment and join in spirit to celebrate the joyous Holiday Season.

For you and yours may it be the best ever, full to the brim with deserved happiness and good cheer, and topped with the rich blessings of peace and good will.

To this is added our best wishes for a most Happy and prosperous New Year.

THE WELDON TOOL COMPANY
3000 WOODHILL ROAD · · · CLEVELAND 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1472

Tough grinding jobs?

Check Vulcanaire high speed precision grinding heads!

Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Vertical adaptor for Surface Grinders. Grinding small slots

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

Horizontal application. Grinding a shoulder Punch.

Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.

Major Vulcan Services

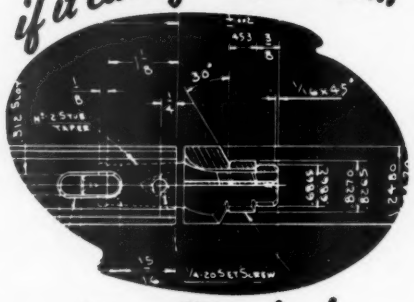
Engineering, Processing, Designing and Building . . Special Tools . . Dies . . Special Machines . . including the Vulcan Hydraulics that Form, Pierce, Assemble and Size . . Vulcanaire Jig Grinders . . Plastic Tooling . . Vulcan Rotary Tables.

VULCAN TOOL CO.

PRITZ STREET DAYTON 10, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1481

if it calls for Specials...



call on Staples!

Turn troublesome, costly "special" hole production jobs into smooth-running, high-performance operations by taking your problems to Staples Special Tool Design and Engineering Service.

Leaders in the field of circular carbide-tipped tool manufacturing, Staples' expert tool engineers can meet your most rigid specifications with special tool designs that will speed your production and deliver precision results, while reducing your tooling costs.

A brief description of your job requirements will bring a prompt response.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Standard Circular Carbide-Tipped Tools, Expansion Reamers

CIRCLE INFORM-A-GRAM KEY NO. 1482

NOT THIS . . . But This

When Your Punch Press Operators Use SAFEED

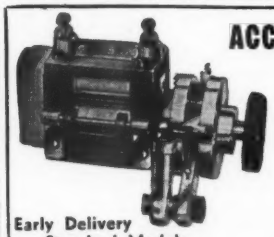
Patented

PREVENTS INJURY — Saves Glove Costs. Feeds ferrous, non-ferrous strip or sheet . . . faster, safer! Use for stamping. Right or left hand non-slip fitted grip, self-adjusting. Sturdy hardened work surfaces. FULLY GUARANTEED

Write Today! **Affiliated Machine & Tool Company**

Early Delivery **260 West St., New York 13, N. Y. CAnal 6-493**

CIRCLE INFORM-A-GRAM KEY NO. 1483



ACCURACY with SIMPLICITY and LOW COST with "RFC" ROLL FEEDS

Models to fit:
ANY PRESS
FOR ANY JOB
FOR STOCK UP TO 12" WIDE

Early Delivery on Standard Models

"RFC" ROLL FEEDS are quality built for long, dependable service.

Write for descriptive literature TODAY

ROLL-FEEDS CORPORATION
Pawtucket, Rhode Island
An Electrix Affiliate

CIRCLE INFORM-A-GRAM KEY NO. 1484

Truman Longley

a Merry Christmas

Bill Kall

Sid Koerpel

and a Happy New Year to all

Bill Dilley

John Klemm

Bob Blair

Jack Kahn

Bill Radune

Bob Polzner

Dennie White

Gene Brill

Led Miller

Ivan Krall

TOOL DIVISION: Drills, Taps, Carbide Tools, Rotary Files, End Mills, Milling Cutters, Diamond Wheels, Air & Hydraulic Cylinders, Valves & Controls, Machinery & Equipment.

PUMP AND FILTER DIVISION: Pumps, Filters, Electric Switches and Controls, Calibrating Tanks and Separators, Gauges, Thermometers, Compressors, Safety Tools, S. S. or Alloy Tanks and Vessels.

AA-446

TELCO

TRUMAN E. LONGLEY CO.
4030 SUPERIOR AVENUE
CLEVELAND 3, OHIO

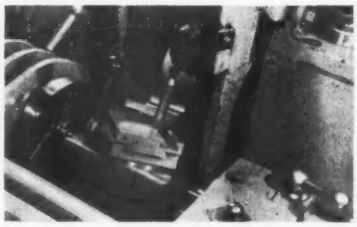
CIRCLE INFORM-A-GRAM KEY NO. 1485

LATHE COMPOUND DOUBLES AS WHEEL DRESSER

Grinding wheels are dressed to any angle desired with accuracy and considerable speed at TEMCO Aircraft Corporation. The Dallas, Texas firm has adapted a Hardinge lathe compound to do the dressing. The compound can be mounted between the centers on cylindrical and thread-grinders, or it can be used on surface grinders.

TEMCO'S thread-grinders have automatic provisions for dressing their grinding wheels to 15° or 30° angles. But any other degree of angle formerly had to be dressed by hand. This was time consuming and sometimes inaccurate.

Grinder operator Harold E. Hall devised the adjustable wheel dresser. He mounted the Hardinge compound — with attached degree marker — on a 4½" x 6½" block of ½" steel with a T-bolt slot. Then he



drilled a center hole at each end of the block at 90° to the slot. Thus, when the compound is mounted between the centers in a grinder, the zero point on the degree marker is opposite the edge of the grinding wheel and perpendicular to its axis.

The diamond-holder on the Hardinge compound can be swiveled, lined up and locked at any one of the 360 degree marks on the degree-marker. Thus, if the compound is set 14° to the right of zero on the marker, for example, it will cut a precise 14° angle on the left side of the grinding wheel.

The diamond-holder has a lateral travel of ¾° in a dovetail slide. This travel governs the width of the cut made on a grinding wheel.

Wheels dressed with the Hardinge compound are accurate to 30 minutes. This precision, and the ability of the Hardinge compound to dress wheels to any angle, permit operators to do a variety of grinding jobs on their conventional machines.

Among these unique operations can be included the grinding of thread-grinder centers without "run-out"; draw broaches with 7° primary lands and 45° secondary lands; router collets with 10° angles; assemblies for various tooling jobs; and crush-dresser rolls used to dress wheels for manufacture of serrated aircraft parts.

PORCENELL: NEW LOW COST SILICATE PROTECTIVE FINISH

The Porcenells, a new line of silicate or glass-like protective coatings which can be fused to any ferrous metal at moderate temperatures, are designed to provide permanent and decorative protection against rusting and corrosion . . . at costs comparable to galvanizing or synthetic resin paints. The new silicates can be applied by spray, brush or dipping and fired at temperatures from 900° F to 1200°F, depending upon the type of finish desired. In substance, Porcenell is similar to porcelain enamel, but is, according to the producer, more easily and less expensively applied primarily because of the low firing temperatures required. Surfaces suitable for Porcenell are reported to include sheet and plate as well as cast, wrought and malleable iron and high carbon steels.

Being inorganic in composition, the Porcenells are not subject to corrosion or organic change. As such, according to reports, they are ageless, fireproof, present strong scratch resistance, permanent color, and do not react to moisture or any corrosive agent normally found in the atmosphere.

Available in a variety of permanent colors and in textures ranging from full matte to high gloss, a single coat of Porcenell is said to offer sufficient protection for most types of protective or decorative service. Porcenell also serves as a corrosion proof base coat over which any paint can be applied.

Typical applications for Porcenell include: architectural, electrical, appliance and transportation industries. It is particularly adaptable to tanks and tubular products.

CORISA LUMBER FOR PATTERN-MAKING

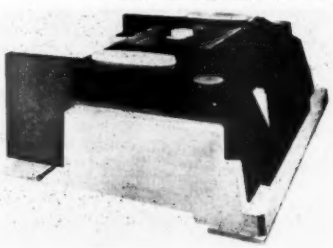
Corisa wood has been found to be an excellent pattern-making material. It is native to South America and is now available to the pattern-making industry in the United States.

Corisa wood is somewhat lighter than pine, but equally strong. Being free of pitch it holds its shape much better than pine, remaining dimensionally stable under adverse conditions even in thin shell sections. A large percentage of the lumber carried in stock is quarter-sawn, which contributes considerably to its stability.

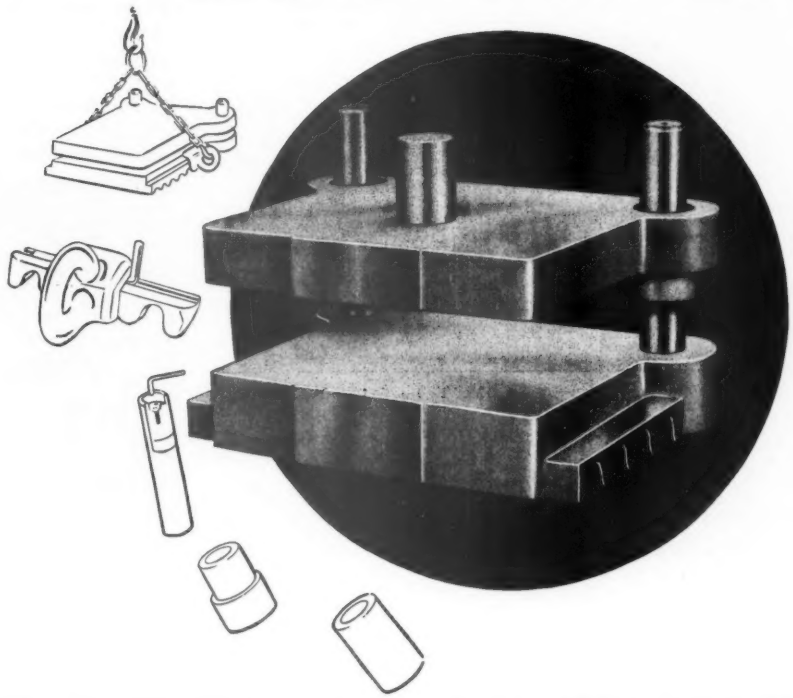
Its workability is excellent, being easy to plane and sand with the grain or across the end grain; carves well; takes coatings readily; and presents an outstanding finished appearance.

Corisa is graded according to National Hardwood Association rules—the same as those governing the grading of mahogany. It is stocked in thicknesses varying from 1" to 3".

Photo courtesy Kindt-Collins Co.



FAMOUS SUPERIOR DIE SETS NOW AVAILABLE FROM JERGENS



ONE STOP SERVICE FOR THE FOLLOWING TOOL ROOM NEEDS

ACME STANDARD BUSHINGS:
Drill Jig Bushings and Liners stocked in ASA & Acme Standard finished or with Grinding Stock; Liner pins and liner pin bushings; Leader pins and leader pin bushings.

FASTENERS & LOCATORS:
Socket Set Screws; Hex & Socket Head Cap Screws; Shoulder Screws; Flat Head Cap Screws; Pipe Plugs Regular & Dry Seal; Dowel & Taper Pins + .002 Dowels; Allenuts; Hex Head Nuts, Screws, Washers.

JERGENS STANDARD COMPONENTS:
Over 500 Standard parts including: Blank Jaws; Sine Fixture Keys; Clamp Shoe Assemblies; Thumb Screws; Jig Rest Buttons; Quarter Turn Screws; "C" Washers; Hand Wheels; Strap Clamps; Studs; Tee Set Kits, etc.

FEATURING REMOVABLE CAP GUIDE PINS

Enjoy the decided superiority of SUPERIOR DIE SETS and SUPPLIES including die springs, layout dies, lubricants, pins & bushings, bolster plates, etc., immediately available from Jergens. Superior Die Sets are available with easily removed cap guide pins that save time, effort, minimize danger of damage to costly dies.

Superior Die Sets and Accessories are distinguished for their long, accurate press runs—their precision manufacture of quality materials and for their exclusive safety features which safeguard against injury to handlers plus easier lifting and manipulating.

All these quality Superior features mean time, material and labor savings for you.

Write for complete specifications and price list.

Jergens BETTER TOOLS AT LOWER COST

TOOL SPECIALTY CO.

712 E. 163rd St. CLEVELAND 10, OHIO
KEnmore 1-2015

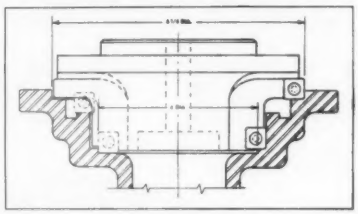
CIRCLE INFORM-A-GRAM KEY NO. 1486

THROW-AWAY CARBIDE INSERTS ELIMINATE COSTLY REGRINDING

Boring, counterboring and facing malleable cast iron transfer case castings is now being performed more efficiently and economically at an Eastern ordnance plant since converting from a boring head with brazed-on carbide tips to one utilizing indexable square Kendex carbide "throw-away" buttons.

This operation is done at 0.022" feed, 375 sfpm, and ⅛" to ¼" depth of cut, on a radial drill press that is equipped with a special guide fixture in contact with bronze wear strips mounted in an arbor directly above the cutter body. The boring head's design permits partial disassembly for easy maintenance.

Under normal conditions, a 12-tip head required reconditioning after a run of approximately 175 pieces. To regrind the brazed boring head and hold all dimensions with a 0.002" tolerance required 20 hrs. If brazing in new tips was necessary, reconditioning time was 34 hrs.



Sketch courtesy Kennametal Inc.

Now, by substitution of Kendex mechanically-held inserts, under similar operating conditions regrinding is entirely eliminated. Standard square Kendex inserts are used — eight style SD-8 and four style SD-12, all of Kennametal grade K6. After 175 pieces are machined, the inserts are rotated to a new cutting edge in a matter of minutes. Since four new cutting edges are available on each insert, 700 pieces are machined after which the inserts are discarded and replaced.

To produce this number of pieces with the brazed head would have required 80 hrs of expensive grinding time.

MAGNETIC SHEET SEPARATORS CUT HANDLING COSTS

Use of magnetic-type sheet steel separators in the punch press department of Cutler-Hammer, Inc. has resulted in significant savings in labor costs and almost complete elimination of injuries from one phase of the firm's operations.

Cutler-Hammer reports that, since installation of the separators in its New York plant last

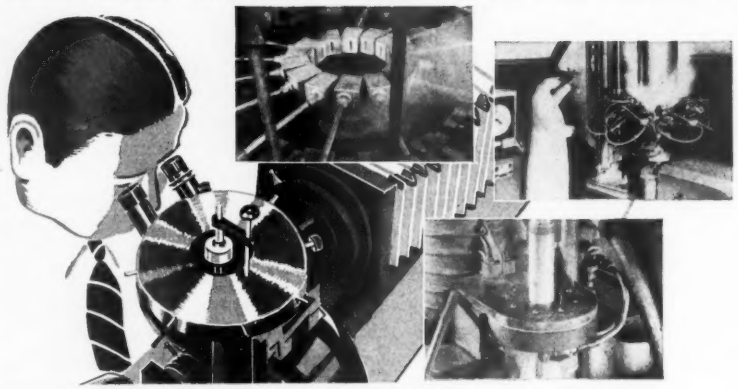
Photo courtesy Basco Mfg. Co.

year, a 5% savings on labor has been achieved. The company makes switchboxes and covers, using 16 and 18 gauge steel sheets of varying sizes. Prior to the introduction of the separators, wear and tear on the operators' gloves was considerable. . .and this is an additional cost that has been cut greatly.

The photo shows an operator first lifting a steel sheet before inserting it into the punch press. Action of the separator has raised the top sheet making lifting simple. As the operator inserts the first plate into the press, the next plate is already raised from its mates and ready to be lifted. Previously, a sharp metal instrument was used to separate the sheets. The result was wear and tear on gloves and numerous painful hand cuts among the workers. This has been eliminated by the magnetic separator, which also helps to prevent damage to polished or specially finished sheet surfaces.

The separator induces a magnetic field among the stacked sheets causing them to tend to repel each other. Thus, the ends fan out leaving an air space between each two adjacent sheets. The separators are available in different models and sizes to suit the size of the steel sheet.

At Lakeside, Where Metallurgy Controls the Treatment



HIS SCIENTIFIC SENSE

Lowers Your Steel Improvement Costs

Lakeside's metallurgists are men of authority whose responsibility stems far beyond the laboratory . . . deep into the actual processing of your steel. Special consideration is given your individual treating problem and recommendations made for the specific process best suited to your most exacting specifications. From perfected, mechanized and controlled processing to precision inspection and testing, metallurgical science controls every step at Lakeside. Why not apply the inevitable economies of this kind of operation to your steel treating problem? Call or write today!

Our Services:

Electronic Induction Hardening, Carbonitriding, Flame Hardening, Heat Treating, Bar Stock Treating and Straightening (mill lengths and sizes), Annealing, Stress Relieving, Normalizing, Pack, Gas or Liquid Carburizing, Nitriding, Speed Nitriding, Aerocasing, Chapmanizing, Cyaniding, Sand Blasting. Laboratory Physical Testing.

THE Lakeside Steel Improvement Co.

3418 LAKESIDE AVE., CLEVELAND 14, OHIO HENDERSON 1-9100

METAL TREATING INSTITUTE

CIRCLE INFORM-A-GRAM KEY NO. 1487

Will You Be There?

Nov. 29-Dec. 2. First International Automation Exposition. 244th Regiment Armory, New York City.

•

Nov. 30-Dec. 2. First Electronic Computer Clinic. 244th Regiment Armory, New York City.

•

Dec. 2-7. American Society of Mechanical Engineers. 21st National Exposition of Power and Mechanical Engineering. Commercial Museum, Philadelphia.

•

Dec. 8-10. American Institute of Electrical Engineers. Eastern Computer Conference. Bellevue-Stratford Hotel, Philadelphia.

•

Jan. 24-27. Plant Maintenance & Engineering Conference and Show. International Amphitheatre, Chicago.

•

Jan. 28-29. 7th Annual Industrial Engineering Institute. University of California, Los Angeles.

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Jan. 31-Feb. 11. Engineering and Management Course. University of California, Los Angeles.

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Design assistance offered.
Also Cylindrical contour milling and jig boring
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JIG BORING
and
Large Precision Machining
Done to your specifications
We Have
13 Jig Borers
KIDDE PRECISION TOOL CORPORATION
30 Farrand St. Bloomfield, N. J.

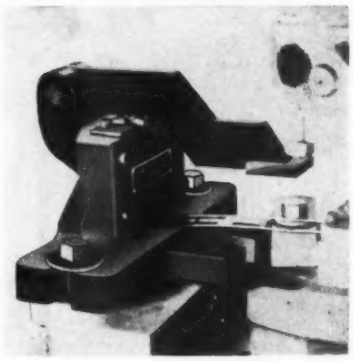
CIRCLE INFORM-A-GRAM KEY NO. 1492

SCRAP CHOPPER POWERED BY PRESS RAM

The new Jaco Scrap Chopper clamps to any press bed. It is powered by the press ram and handles steel up to 3″ wide and 0.062″ thick.

Costing far less than power driven scrap choppers, this unit is independent of the press die itself. Spare blades are installed quickly whenever the cut-off blade needs sharpening with a minimum of lost production time because of the independent action.

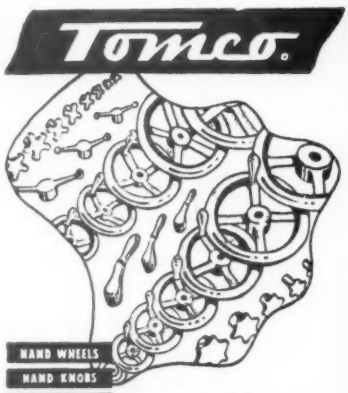
This rugged unit, a product of Jaco Devices Co., Inc., 96 High St., Hingham, Mass., is guaranteed to work on any job within the specified limits of 3″ and 0.062″.



For additional information, contact the manufacturer, or—
Circle Inform-A-Gram No. D7.

DYKEM
STEEL BLUE
Stops Losses
making Dies and Templates
Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.
Write for sample on company letterhead
THE DYKEM COMPANY
2303L North 11th St. • St. Louis 6, Mo.
With DYKEM Steel Blue
Without DYKEM Steel Blue

CIRCLE INFORM-A-GRAM KEY NO. 1493



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Blank or Machined—from stock

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Does jobs no drill can do!
up to 10 Times Faster than Boring!

NEW Clark
"HOLE-MAKER"

Totally new—maximum rigidity, no chatter! Roughs or finishes holes to exact size in FORGINGS, CASTINGS, BOILER PLATE, THIN STOCK, TUBING; CROWNED, CYLINDRICAL AND FLAT SURFACES. One of 3 blades is *always* in the cut on odd work shapes—*smooth action even on intermittent cuts!* Use new HOLE-MAKERS in radial drills, drill presses, turret lathes, portable electric or pneumatic drills, etc. Excellent for trepanning and rough boring I.D.'s in Tubing, Castings, etc...a real production tool!

Holes can't drift, spindle can't deflect—it's piloted 2 ways!

Cuts steels, plastics, transite, non ferrous metals, stainless steel, etc!

5 ADJUSTABLE SIZES: Specify Straight Shank or M.T. 2. 3. 4. Other tapers on order.

Models:	102	203	304	405	506
Capacity:	1" to 2"	2" to 3"	3" to 4"	4" to 5"	5" to 6"

Order from your dealer or write for catalog!

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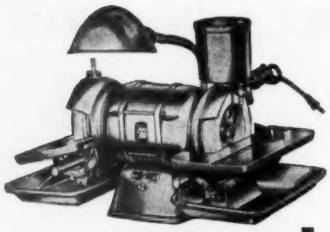

Accurately sharpens
CARBIDE TOOLS

BALDOR Grinder No. 500 — Built especially for sharpening carbide tools quickly and accurately.

Reversible ½ h.p. capacitor type motor, 3450 rpm; heavy shaft, large ball-bearings. Dynamically balanced armature. Motor withstands repeated over-loads. Protractor at each end of grinder; water pot and pans, moveable light, guards and tool rest tables.

Complete, as shown
$149.20

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Baldor
GRINDERS

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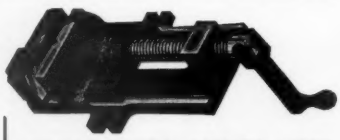

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• This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type?
Write today for bulletin on the extensive Yost line

YOST MFG. COMPANY
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Meadville • Pennsylvania

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Drop-hammer formed parts are usually trimmed between operations. And the conventional band saw method of trimming tends to leave burrs and chips that are easily transferred to lead or kirksite drop-hammer dies on secondary operations, a potential cause of damage to the die and costly reworking.

The problem of burrs and chips was eliminated at the El Segundo (Calif.) plant of Douglas Aircraft Company by use of a Whiting Quickwork rotary power shear for trimming the aluminum alloy drop-hammer formed parts. Not only has improved protection of expensive dies been achieved, but the trimming operation itself has been speeded up.

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BY A QUICK, EASY, INEXPENSIVE METHOD
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— Except Screw Machine Cams —
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FIXED ABRASIVE LAPPING & POLISHING STONE

This manufactured Stone laps and polishes most metals in minutes. The least skillful person can produce a 2 Micro-inch finish, even on hardened steel, in minutes. The Stone is charged throughout its two inch thickness, so that no compound is required at any time.

No metal or material will load the Stone, even stock removed from aluminum or carbon is easily wiped away with an oil wetted cloth. Reconditioning when required is easily done in your own shop.

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This informative, FREE BOOKLET will help you to:

1. Determine your particular needs.
2. Buy no more accuracy than you require.
3. Get the full amount of accuracy you specify and pay for.

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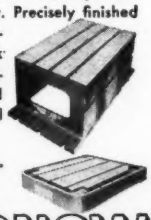
SNOW RADIAL DRILL EXTENSION BASES and BOX TABLES!

Snow Extension Bases and Box Tables increase radial drill versatility and production . . . make difficult, expensive set-ups fast and easy. Precisely finished from Meehanite castings. They assure work accuracy, plus maximum service life and dependability. All T slots machined.



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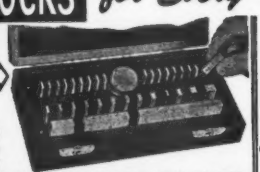
Supplied in one Superior Accuracy
5 MILLIONTHS ± ACCURACY

34 BLOCK SET (shown)...**$125** INCL. OPT. PARALLEL

82 BLOCK SET.....**$275** IN CASE

These sets will supply the needs of any discriminating shop that must work to gage-block precision. IMMEDIATE DELIVERY



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For Individual Mechanic
$22.50
OPTICAL PARALLEL
$5.00 Extra

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An easily adjusted variable vane venturi in the new line of Micro-Fog Lubricators for air

equipment enables one unit to meet the requirements of a much wider range of operating conditions and handle applications which previously required several sizes of lubricators.

At 80 psi, for example, the 3/8" size can be set for a low flow

. . . *Continued on page 153*

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The stock straightener that is ready for "AUTOMATION" - - can be supplied with any type switching relay or motor. (at slight add'l. charge)

ORDER DIRECT on our 10-day, money-back guarantee. Our machine must save you money, or you return it.

The **ONLY** low cost stock straightener with all these features:

1. Built-in stock oiler.
2. Hardened and ground rollers.
3. All lower rollers gear driven; this cuts feeding pressure.
4. Front and rear Guide Rollers.
5. All bearings ball, oil impregnated bronze or needle.
6. Straightens steel up to 2" wide by .062" thick; brass and aluminum to .093".
7. Adjustable and counterbalanced free loop arm will stop straightener if material buckles or drops; can also be set for continuous running.

$650.00
with VARIABLE SPEED DRIVE

(Shown with gear cover removed)

The "MIGHTY MIDGET" Stock Straightener
SPERMAN METAL SPECIALTIES 1085 ROGERS AVENUE BROOKLYN 26, NEW YORK
Manufacturer of "MIGHTY MIDGET" Radius and Angle Dressers

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Specify DESTACO SHIM STOCK

Made from selected steel or brass, rolled to precision limits, oiled to resist stain and rust, free from burrs. Twelve assorted thicknesses .001" to .015", sheets 6" x 12", coils 120", identified every 6" by thickness and amount remaining on roll.

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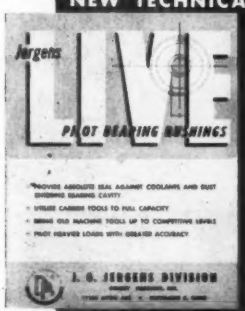
NEW TECHNICAL CATALOG ILLUSTRATES
precision
COST CUTTING
applications of
JERGENS LIVE PILOT BEARING BUSHINGS



Send today for your free copy of Jergens new technical catalog filled with application photographs, engineering data, cost saving ideas and questions and answers on uses and performance features of Jergens Live Pilot Bearing Bushings.

See how Jergens Live Bushings provide absolute seal against coolants and dust entering bearing cavities — utilize carbide tools to full capacity on boring mills, radial drill presses, and milling machines — bring old machine tools up to competitive levels and pilot heavier loads with greater accuracy.

Write for your copy today — template sheets available upon request.

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CIRCLE INFORM-A-GRAM KEY NO. 1513

CUT QUOTES
UP TO 30%
ON PRODUCTION TURNING AND GRINDING OPERATIONS
FOR HIGHER
PRODUCTION

- Eliminates Driving Dog
- Whole length of workpiece can be machined in one pass
- Machine need not be stopped between workpieces
- Workpiece end need not be square or flat

Available from stock in Morse Tapers 2 to 6 for 9/16" diam and up

Our New
DRIVING CENTER
(Pat. Applied for)
is revolutionizing any work done between centers by replacing the driving dog with a driver on the end of the workpiece. Thus, the hazard, fatigue, whip, bow, and vibration caused by driving dogs are eliminated, and the work quality is greatly raised.

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since 1907

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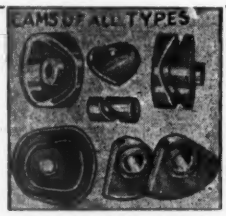
CAMS



MADE TO YOUR SPECS.

Dr. Charles Eisler, M. E. Pres.

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ALLOY TOOL SHANK REDUCES CHATTER

Boring bars and lathe tool shanks of a new metal alloy are reported to reduce tool chatter by as much as 50%. These "No-Chat" shanks are made of high density tungsten alloy, are more rigid than steel, and conduct heat away faster than other metals.

Tests by various users in the metal-working field demonstrate that with No-Chat shanks, cutting tools run cooler and vibrate less, and therefore last longer between grinds.

With reduced tool chatter, deeper cuts can be made, and often smoother surfaces requiring no finish grinding are produced.

No-Chat shanks are reusable because the alloy does not anneal. New carbide tips are readily brazed to the shanks for reuse. These shanks can be used with all standard cutting tips.

ONE SOURCE -

Assures uniformity and precision between taps and chasers from country's largest independent manufacturer of die heads, chasers (milled, ground thread or tapped form) solid and solid adjustable taps. All tangent type chaser threads ground from solid. Write for catalog.

PROMPT DELIVERY

Save 10-20% on special solid taps

CHASO-ROYCO TOOL CO. INC.

P. O. Box 268 at Akers
North Branch, Michigan

Representatives in principal cities

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RAPID SET-UPS: with extreme accuracy—every time and on the first try!

Brookfield TOOL HOLDER

One Brookfield Tool Holder = One Conventional Tool Holder + Stock of at least 100 Bushings.

In Essence: A Floating, Precision Vise

- Adjustable V Jaw
- Axially True Design
- Balanced-Pressure Locking

No more fussing with bushings . . . just slip tool in jaw and tighten . . . run-out is less than .0001 per inch . . . Brookfield Tool Holders guarantee clean, easy, solid set-ups every time and on the first try! Models available for nearly all automatic and hand screw machines, turret lathes, radial drills, etc. Also useful as Adjustable Steady Rest and Work-Holder.

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For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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DRESEL-BETZ CO.
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Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings.

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1436 East 47th St., Cleveland, Ohio. Founded in 1908. Builders of Special Machinery. General Machine Work.

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A. P. SCHRANER & CO.
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(This space, 1" deep, costs $12.00 per insertion). A depth of ½" costs $6.00 per insertion. (Sold on 12 time insertion basis only). TOOLING and PRODUCTION, 1975 Lee Road, Cleveland 18, Ohio.

. . . Micro-Fog, from page 151

range of 5 to 9 cfm, a high range of 50 to 100 cfm, or any intermediate range desired. The new line includes 20 models in pipe sizes of ½" to 1", capacities of ½ pt. to 4½ gal., and flow range from 5 to 250 cfm at 80 psi.

The new units incorporate the C. A. Norgren Co. features of transparent dome for visibility of oil feed and supply, an auxiliary air circuit for accurately controlling the oil feed from 1 drop in 20 min. to 15 drops per min. A constant oil level feature eliminates the possibility of the rate of oil feed being affected by the quantity of oil in the bowl.

Norgren Micro-Fog Lubricators can produce a very fine oil fog and deliver it over long distances for obtaining equal distribution to several outlets. The fog is carried suspended in the air stream so air line and equipment are not flooded with oil. C. A. Norgren Co., Englewood, Colo.

Circle Inform-A-Gram No. D6.

Star Stainless screws have clean—bright and—shiny—heads

Star STAINLESS SCREW CO.
Little Falls 4-2300
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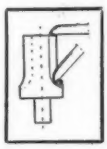
Punches Shaped from the SOLID with OTTMANN Punch Shaper

FEATURES:

1. No holder plates required.
2. Simple work mounting.
3. No re-setting — Work can be adjusted to any position of tool.
4. Forms shaped accurate. Parallel and true.



5. Minimum hand work.
6. Convenient, simple operation. Uses standard shaping tools.

Write for Literature

CEDAR-WEST TOOL CO., INC.

90 WEST ST. NEW YORK 6, N. Y.

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Announcing the

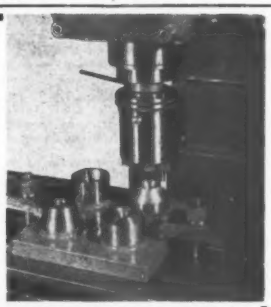
NEW WOHLHAUPTER TAPERMASTER

Rugged and Compact Construction

cuts ANY angle Inside or Outside

Operating accuracy as high as ±.0002" • Range 6"

SAVES SET-UP TIME



A worthy addition to the universal automatic MASTERHEAD for Boring - Facing - Recessing - Undercutting.

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Expanding Mandrels

Accuracy 001" - No Distortion

No Slipping - Everlasting

K.O.LEE CO.

ABERDEEN, SOUTH DAKOTA

If it's made by **Lee** *it's a* **"Knock-Out"**

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SCRUBBING CHAMBER REMOVES PAINT FROM EXHAUST AIR

Efficient removal of paint particles from the exhaust air is a feature of a newly developed water spray paint booth.

Using an entirely new type baffle chamber, the Cleanaire spray booth provides a positive air cleaning action that prevents paint pigments and volatiles from reaching the exhaust stack or the outside air.

The air scrubbing chamber features a specially-designed spray header mounted within two curved baffle plates. When water is pumped into the header, it sprays in three directions from three rows of orifices and strikes the baffle plates building up a violent spray turbulence that removes practically every particle of paint.

Tests and an installation in an automobile factory showed that the Cleanaire will exhaust air containing not more than 5 grains of solid per every 1000 cu ft of air handled and will exhaust air containing not more than 50 parts per 1,000,000 solvent vapors. (Based on spraying rate of approximately 3 gallons of paint per hour, per foot-length of booth).

The efficiency of the air and water cleaning action throughout the booth eliminates daily cleaning maintenance.

PRESSURELOK-224

the best diamond wheel ever developed for carbide tool grinding. Guaranteed ultimate cutting life from each diamond particle in every wheel.

UNITED STATES DIAMOND WHEEL CO.
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IMMEDIATE DELIVERY on all wheel sizes, STRAIGHT, DISH, CUP, FLARE and MOUNTED WHEELS; HONES.

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Use TOOLING and PRODUCTION's INFORM-A-GRAM Card to obtain information on products and services advertised and editorially described.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work *now*—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

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LAPEER CLAMPS BOOST TV TUBE PRODUCTION 15-20% AT RCA

Operator placing a tube in position. Note the Lapeer clamps.

At Radio Corporation of America, Lapeer special kinescope clamps are paying off in stepped up production in applying the phosphor to the faces of TV picture tubes. Gains from 15 to 20% have been registered.
Boosted output is obtained through the compact design of Lapeer clamps—permitting closer spacing and the installation of more fixtures on the traveling belts used in the operation.
Because the coating on tube faces must dry evenly, without ripples, it is important, too, that there be no vibration during clamping. Easy to operate, Lapeer clamps overcome this hazard. It's probable that Lapeer experience can help solve your clamping problems, too. Write for catalog—today

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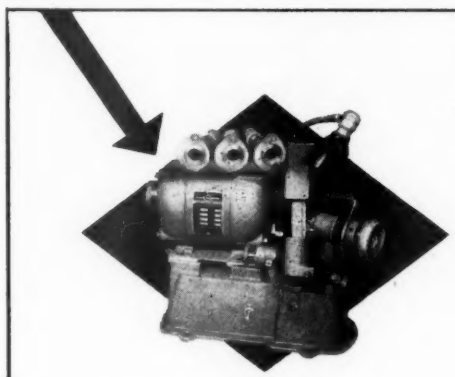
4122

CIRCLE INFORM-A-GRAM KEY NO. 1543



SHARPENS SMALL DRILLS ACCURATELY — WITHOUT SKILL!

The *Black Diamond Drill Grinder* is the only drill grinder so fast and easy to operate. Used regularly by thousands! Enables anyone to grind small drills to absolute accuracy.

- **Exclusive "positive positioning" assures precision grinding.**
- **No skill required by operator.**
- **Both lips ground in one operation.**
- **Web thinning made easy with special attachment.**

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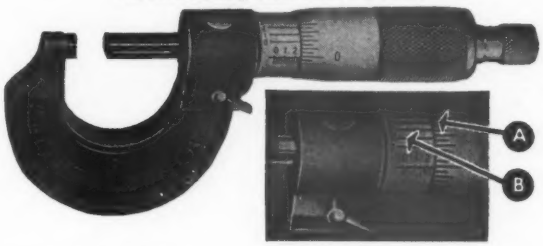

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B. Deep, machine divided graduations on both thimble and barrel assure easy reading under most lighting conditions.

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• Dull chrome finish on thimble and barrel eliminates glare.

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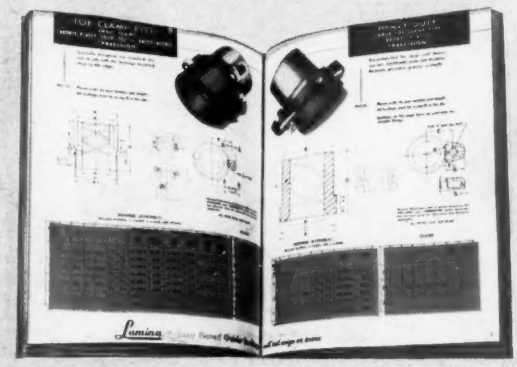

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